Vomitings in hot Climates and hot Seaſons much preferr'd before Clyſters and Purges, 36, 709.

W.

WAter percolates from the Seas through the Sands, to riſe and fall with the tides, wherever they dig at the point of Jamaica; yet no ſteames ariſe there by heates, 36, 701.

Weavils breeding in meal, currans, raiſins, *&c.* how to be deſtroy'd in Jamaica, 36, 701.

Whales of ſtrange kinds about Bermudas deſcribed, 40, 793.

Winter, ſee *Swallowes*, ſupra.

Wood, a Baſtard-Cedar in Jamaica, ſeeming cloſe-grain'd, but penetrated by Brandy and Wine, 36, 705. *Many* ſorts of Wood there, beſides Acayou, which breed no Wormes. A white wood there, which in Ships breeds no Wormes, 36.705.

A *Wood* ſtinking like human Excrement: See *Anſwers* from Java-major, 43, 863.

Wood-Lice in Jamaica, which eate Books, the Paper, Print, and Covers, and ſome ſorts of Wood, not all ſorts, 36, 706.

ERRATA.

NUmb. 43. *p.* 876. *line* 48. dele all this, *p.* 865. *l.* 24. *r.* mPC; *p.* 866. *l.* 3. dele, *ſiniſtrorſum*; and read it, as 'tis in the Text: but *p.* 865. *l.* 28. *r. reapſe*, *p.* 870. *l.* 21. *r.* Præcelsion. *p.* 855. *l.* 10. *r.* Elder, *not* Alder, *twice*. *p.* 857 *l.* 21. *r.* plac'd in it and.

FINIS.

LONDON,
Printed by *T. N.* for *John Martyn*, Printer to the *Royal Society*, and are
to be ſold at the *Bell* a little without *Temple-Bar*, 1668.

PHILOSOPHICAL
Tranſactions:
GIVING SOME
ACCOMPT
OF THE
Preſent Undertakings, Studies and Labours
OF THE
INGENIOUS
IN MANY
CONSIDERABLE PARTS
OF THE
WORLD.

VOL. IV.

For *Anno* 1669.

LONDON
Printed by *T. N.* for *John Martyn* at the Bell, a little without
Temple-Bar, Printer to the *Royal Society*, 1670.

To the Right Reverend Father in God *SETH* Lord Biſhop of *SARUM.*

My LORD,

I *Apprehended it my Duty in many reſpects to dedicate to your Lordſhip this ſmall Volume of the* Philoſophical Tranſactions. *For We ought to remember, that 'tis now about* 15 *or* 16 *years, ſince your Lordſhip Geometrized* Aſtronomy, *which did oblige the chief Aſtronomers of this Learned Age: And that you added Life to the* Oxonian *Sparkles, I mean, that Meeting, which may be called the* Embryo *or Firſt Conception of the* Royal Society*: And that to vindicate our Univerſities from a general Deluge, when many had a ſiniſter mind againſt them,* You *appeared publickly, even in thoſe rough times,* Academiarum Vindex. *Whence we nay juſtly inferr, that you will receive much comfort to ſee both Univerſities contribute ſo effectually by their valuable Works to the Advancement of ſolid Learning: In* Oxford *for the* Mathematicks *and* Mechanicks*; as you may find here in the Abbreviation of* Mechanica *ſive* de Motu *&c. And we had here alſo given you the Brief of a Noble Argument from* Cambridge *concerning* Opticks, *if we had not waited for ſome* Geometrical Lectures *from the ſame Worthy Author, proper to be publiſht with thoſe his* Opticks. *And if in the fore-going* Volume *ſome of the chief Branches of the Mathematicks, Algebra, and other parts of real Philoſophy (in which your Lordſhip with much affection and ſucceſs hath theſe many years been happily concerned) were diligently ſollicited for the benefit of the Studious in thoſe excellent Sciences; I hope, we may not immodeſtly ſay, that in this Volume we have given an Accompt of ſome further Improvements in the ſame kind (N.* 45. 46. 49; *) and of a foundation laid, and in ſome* Tables *commenced for the rectifying of* Aſtronomy *by obſerving Celeſtial Appearances in our Engliſh Horizon, by a Learned and Ingenuous Perſon who profeſſeth good reſpects and readineſs of ſervice to the* R. Society *N.* 55.

My Lord, *I muſt here forbear at large to repreſent, How much you have contributed to the promoting all parts of conſiderable knowledge, both by your own private Studies, and in Juncture with the ſaid* Society *ſince its* Inſtitution. *I muſt be rather careful, that* *this my free Addreſs may have no appearance of uncomly obſequieuſneſs, but may be ſupported by firm grounds of ſober and generally acknowledged Truth. And in this Age of Calumny we have good cauſe to rejoyce in the Conſpicuous Examples of ſuch, as have perſonally aſſiſted, and therein proved their fitneſs to officiate, at the higheſt Altars, for the Government, and for the Safety and Ornament of the Church, and who withall have made the deepeſt Reſearches into the Works of God, of Nature, and of Art. Thus it was in the firſt Model of the World, before fruitleſs Controverſies and verbal Altercations had made a wide difference between the* Works of God *and the* Notions of Men. *Antiquity attributes the firſt Monumental Hieroglyphicks to* Seths Pillars; *the firſt Naval Architecture to* Noah; *the Syderal Arts to* Abraham; *the Holy Utenſils, fitteſt for a portable Tabernacle, to* Moſes; *the Architecture of the faireſt Temple to* Solomon; *and generally the moſt Uſeful Sciences, to the no leſs Devout than Wiſe Men of the Eaſt. And thoſe Illuſtrious Propagators of the Goſpel, who in the Primitive conflicts and diſtreſſes of the Church were enabled to diſpel the darkeneſs of the Gentiles, both by their Writings and Sufferings, were many of them the beſt Philoſophers of thoſe Ages; at leaſt of thoſe Countryes, where they diſpenſed the Heavenly Myſteries.*

This Congratulation we owe more particularly to your Lordſhip for thoſe Divine Diſcourſes, in which you have publickely refuted Atheiſme, *and with it thoſe Men, who ſtand in their own light, in denying the beſt Evidences of their own Priviledges and their ſureſt Titles to an Happy Eternity. And hence alſo the Senſualiſts and Men of Animoſities and of a endleſs Contentions may learn, that they, who follow cloſeſt to the ſtreight Line, and are in the neareſt approaches to the Center of Truth, and to the Fountain of Purity, as they are more ſecur'd from Deviations, and the loſs of Time, ſo they have freer Spirits and better leiſure to advance the General Benefit of Mankind. And hence I account myſelf well aſſured of your Lordſhips countenance, whilſt I am faithfully devoted to theſe ends; being always*

My LORD

Your Lordſhips

Very Humble and much Obliged Servant

Henry Oldenburg Soc. Reg. Sec.

BRITISH MUSEUM NATURAL HISTORY.

Fig. I.

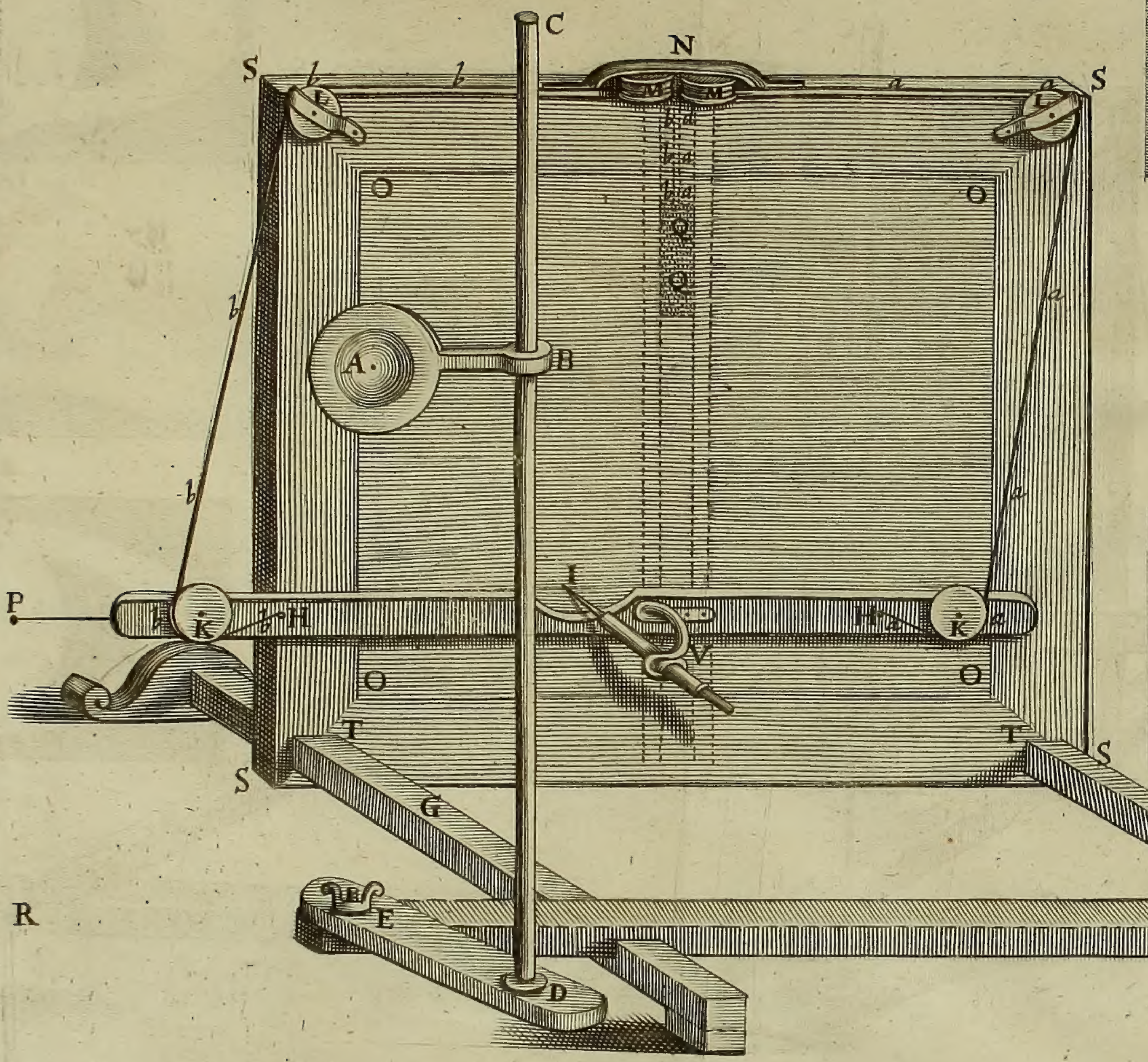


Fig. II.

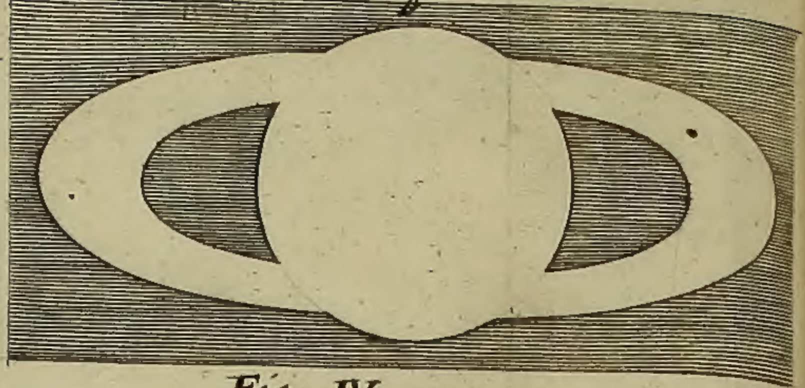


Fig. IV.

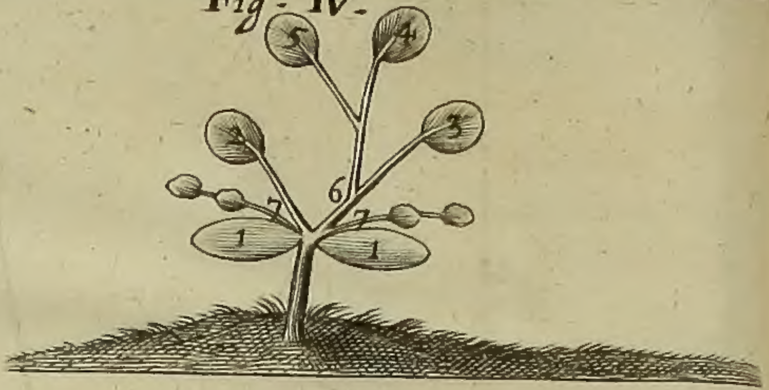
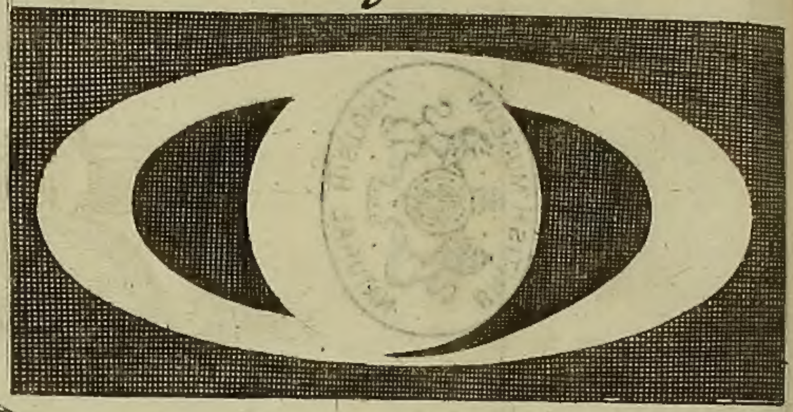


Fig. III.



Numb. 45.
Beginning the Fifth Year.

PHILOSOPHICAL TRANSACTIONS.

March 25. 1669.

The Contents.

A Preface to the Fifth *year of theſe* Tranſactions, *which is herewith begun. The Deſcription of an Inſtrument for drawing any Object in* Perſpective. *An Obſervation of* Saturn, *rectifying ſome former Obſervations of that Planet. An Extract of a Letter, written from* France *to the Publiſher, concerning the Ordering of* Melons. *An Account of two Books.* I. *Renati Franciſci Sluſii MESOLABUM,* 2^{a} *Editio auctior.* II. *Tractatus de CORDE, item de Motu & Colore SANGUINIS, &c. A. Richardo Lower, M.D.*

A PREFACE
To this *Fifth* Year of the Tranſactions.

IT *may perhaps be expected, that here at the Entrance into the* Fifth *Year of theſe Philoſophical Communications, ſomething ſhould be prefac'd, as hath been done formerly for an Introduction into each of the Four preceding years, beginning always (according to the* Engliſh *Accompt) in the Moneth of* March. *Briefly then, I ſhall make a few freſh Reflections on what is paſt, to the purpoſe of Impreſſing ſome few things perhaps not altogether inconſiderable; And thence offer a Proſpect of what may be hoped to be the Product of our future Endeavours, as God ſhall vouchſafe to proſper them.*

In the firſt *Volume, containing the Tranſactions of* Two *Years,* 1665, 1666. *though we were fatally interrupted by the* Plague, Wars, *and the horrible* Conflagration *of our* Metropolis; *yet we then made an Attempt of laying ſome Foundation for the Improvement of real Philoſophy, and for the ſpreading of Uſeful knowledge; in publiſhing Advices and Directions for the writing of an Experimental Natural Hiſtory; in pointing out Eſſays, Patterns and Exemplars, that have hitherto been deſigned in that kind; in giving notice of divers Artificial Engins and Inſtruments, which may be helpful for the further Diſcoveries of* Nature, *or for the greater performances of* Art. *We ſought out, how far Art had then arriv'd towards the perfecting of the* Microſcope; *and by what means that curious Inſtrument might be advanc'd; and what Informations it would afford us, either upon the view of minuteſt Bodies; or of the Texture, Surface, Poroſities, Smoothneſs or Inequalities of other Bodies, that were in our power for ſuch approaches. The like care we had for* Teleſcopes, *by what Operations, Engins, and Applications they might be further improv'd; and what was the moſt, they could thus far perform. Then we related the Finding out of the Rotation of ſome of the* Planets, *and the Changeableneſs, and Seaſons of abſence, or Obſcurity in ſome of the* Fixt Stars, *or ſuch as ſeem'd to be of their Train. And never, I think, were* Comets *ſo chaced, their Figures and Appearances ſo detected, their Motions almoſt reduced to Rule, and in a manner predicted; the* Solar Eclipſe *in ſeveral and diſtant places carefully calculated. And not to recite here, what was attempted and done by* Burning-Glaſſes; *I ſhall but name the Inſtruments deviſ'd to* Meaſure *the* Weight *and the Changes of Weight of the* Air, *and other aſcending and deſcending* Fluids, *either with the Preſſure of the whole Atmoſphere, or of ſmaller parcels freed from that Preſſure; I mean the* Baroſcopes, *and the* Pneumatick Engins. *There were alſo offred* Hygroſcopes, *to note the degrees of* Drought *or* Moiſture *in the Air*; Thermometers *to meaſure the degrees of* Heat *and* Cold; *and an Inſtrument to* graduate *Thermometers to make them* Standards *of* Heat *and* Cold; *an Inſtrument to meaſure the* Refractions *of* Liquors *of all kinds, for eſtabliſhing the Laws of Refraction*; Hydroſtaticks *to meaſure the Weight of Liquids, and divers other Contrivances to find out the Statical poſition, tendency and gravitation of Liquids in all parts. Beſides, Engins to break the hardeſt Rocks; Huge Wheels, and other Engins for Mines deſcribed; To raiſe Winds, by the fall* *of Waters; An Inſtrument to examine the greateſt Depths of the Seas; Another, to try for freſh waters in the bottoms of ſome Seas;* Pendulum-watches *to aſcertain* Longitudes. *But I muſt refer to a greater ſtore of ſuch uſeful Inventions commemorated by Mr* Sprat *in his Hiſtory of the* R. Society.

Neither had I here mention'd theſe, but to give this Advertiſement; That ſometimes one of theſe Inſtruments may open a fair Portal for more Volumes of the moſt obliging Philoſophy, than can be abſolv'd by many hands in ſome Ages. It will not be meer Preface, *but cloſely agreeable to the Intention of theſe Tracts, if I here inſtance one particular, which may poſſibly ſeem to ſome of the loweſt value, and yet may chance to prove of greater importance, than at firſt we are apt to imagine. I will name good* Scales *both of the niceſt kinds, and ſome of a ſtronger frame. Now this I would repreſent. 'Tis certain, ſome Bodies do increaſe their weight in a ſtrong Fire: See the Experiment in the ſaid Hiſt. of the* R. Society, *p.*228. *And Honorable* Mr Boyle *hath proved, That even* Solid *and* Coldeſt *Bodies have their* Atmoſpheres; *Some their* Electricity; *and ſome their* Magnetiſmes: *And 'tis palpable, that ſome draw more Aliment, either from the Earth, or from ſubterraneous Liquors, or Spirits, or from the Nutritious parts of the Air, or other Influences, which deſcend through the Air, than they expend in their Atmoſpheres; And perhaps more at certain* State *times, till they have acquired their due Increment. This being obſerv'd, it ſeems eaſie to deviſe, How to examine by* Scales, Glaſſes, *and ſuch ſlight furniture, whence Vegetables, many kinds of Stones, Metals, and other Minerals, have more or leſs of their Increment, and whence they obtain the ſtronger Fermentation, which conſerves them, or promotes their perfection in their kind: Whether Glaſs, or what other Materials, do obſtruct or retard the reſort of any or all of theſe Spirits, Heats, or Influences: Whether* Ever-greens, *the moſt fragrant or ſtrong-ſenting, hot or cold Plants, draw more of their ſubſtance from the free Air; and which draw more from the ſubterraneal ſupplyes. And ſo we may examine Earths; and Minerals. We ſee many Tracts of Land, which yield peculiar Ferments, ſometimes* Vitriolate *Earth, ſometimes* Aluminous, *ſometimes* Nitrous, *ſometimes* common-Saline, *healing* Bolus's, *and Earth proper for* Fullers, Tobacco-pipes, *&c. Sometimes the Ferment is ſo hot, as to hollow the ſurface faſter than can eaſily be* *allay'd by Mixtures of a more ſullen ſoyl. And ſometimes the Natural ſurface is ſo ſullen, as to ſwallow and devour the richeſt Compoſt, before it rewards the induſtrious Husbandman or Gardner: And ſome do highly pretend to make by Art* Nitri-fodinas perpetuas; *to deviſe the* Magnets, *which ſhall draw to our Uſe the* Alimental Nitre of the Air. *I ſhall not ſtay to engage for or againſt either of theſe; but by thoſe curious Utenſils we may ſoon examine, What may be done in good earneſt, and how far clear Experiments will anſwer to thoſe alluring promiſes. And though we ſhould fail of the Particulars, yet thence we may chance to dive into ſome Secrets of very uſeful Philoſophy, and find other Influences, than are either* Electrical, *or in the common ſenſe* Magnetical, *but pregnant to diſcloſe the Cauſes, and to remove the Defects of Fertility, and to impart other no leſs valuable vertues. For there are more kinds of Vegetables than are commonly ſo call'd, or ſo conſider'd; as our Hiſtory of* Oſteo-colla, *and the beautiful* Stone-plants *growing on the hard Rocks in* Jamaica *(to omit many other Inſtances) do teſtifie. And we ſee by Experience, that peculiar Earths,* Fullers Earth, Tarras *for Veſſels, and ſome kinds of Stones, and of Mineral Ores, have their real Increaſe of Subſtance in their times of Seaſons, and proper places. Many Noble Perſons are Lovers of Gardens, and are willing to entertain* Exoticks; *and are provided of the* Rocks, Grots, *and* Crypta's: *Poſſibly, if they ſhall have a deſire to ſearch into the Cauſes of theſe over-hot ferments, and of the ſlow-pac'd duller Earth, they may happily find unexpected Treaſures in their own private Incloſures. The* Spade *and* Pick-ax *will ſhew the proximate Cauſes, or at leaſt ſome of the Concomitants of every kind of Fertility, and of every kind of Barrenneſs; and the* Scales *will diſtinguiſh real and ſubſtantial growth, and the ſeaſons of it, from deceiving Expanſions: And then, by Arches and Vaults, by opening Springs, by heaps of Stones, here of Lime-ſtones, there of Marl-ſtones, and in ſeverals of Pebbles, white and black Flints, Marcaſites, Mineral Ores, Magnets, and Bodies of the ſtrongeſt Electricity, where they may be had, ſome laid as in their Natural Beds, and ſome dislodged in an unkind poſture, we may* Artificially *frame ſuch ſubterraneous Furnaces and Stoves, as may, by a calm Proceſs, afford us ſome of the Wonders of Divine Chymiſtry. And thus we may have refrigerating* Conſervatories *for cooling* Lenitives. *Here we may feed moiſtning,*

ning, drying, olly, acid, embalming, tartareous, and every other ſort of Steams and Vapours: And what every Maſs effects upon the Confiners at what ſeaſons, and at what diſtance, the Scales *and other Implements may detect. The Ingenious* Sanctorius *hath not exhauſted all the reſults of* Statical *Indications. They may ſerve to calculate or weigh all* ſorts *of Tranſpirations, to diſcriminate Generative, Nutritive, Sanative, Reſtorative, and Benigne, from Maleficiate and Noxious Spirits; and may inſtruct us how to guard from what is hurtful, and how to retain that which is congenial. This* Memorandum *was due to thoſe Worthies, who have contrived theſe Philoſophical Tools; and who, in deſpight of Calumny and Raillery, have in theſe and many other reſpects deſerv'd as great Names (I muſt ſay this ſoftly) as they, who have adorn'd the beſt Records of foregoing Ages. But to return; Here in this* firſt *Volume were alſo diſpatch'd* Enquiries *and* Directions *for all Travellers by Sea and Land, for our Correſpondents and all Ingenious perſons reſiding in the more famous parts of the World; to review, and return a ſafe Teſtimony of all ſuch Obſervables of Nature and Excellencies of Art, as carry the greateſt fame, or ſeem moſt conſiderable for Uſe or Inſtruction. We have furniſht particular* Inquiries *for* Mines, *for* Seas, *for* Springs, *and for the Effects of the late Invention of* Transfuſing Bloud, *and* Medicated Liquors *into the Veins of Animals.*

In the ſecond *Volume, containing the* Tranſactions *of the Year* 1667. *we ſpread ſomewhat more largely abroad the* Inquiries *proper for more places of principal note; and then we received from our Correſpondents, and publiſh'd, many not un-inſtructive* Anſwers. *And here were added more* Inſtruments *of* Art, *ſome newly deviſed, as an Inſtrument for* Meaſuring *the* Diameters *of Planets to great exactneſs. We offered fuller Directions for* Sea-voyages; *collected divers* Anomatical *reſearches; related many odd effects of the* Tranſfuſion *of* Bloud, *and of Medicins into the Veins of Animals; a deeper Inveſtigation and further Accompts of* Reſpiration; *a diſſected Animal preſerv'd alive by the Wind of Bellows; the Influence of Air upon the Life and Growth of Vegetables, upon Luminous Bodies, and Burning Coals, &c.*

In the third *Volume, for the Year* 1668. *(beſides a good ſtore of Inſtructive Anſwers to the former Inquiries, and ſome further Progreſs in the diſcloſures of Nature) hath been introduc'd ſomething of*

Algebra, *and other branches of the* Mathematicks *and* Mechanicks, *for the uſe of thoſe that are ſtudious in thoſe Noble Arts, as well to direct in the beſt Methods, and to detect Erroneous adventures, for the behoof of generous Beginners, as for the ſatisfaction and further encouragement of them that have attain'd higher accompliſhments.*

Alſo, in each of theſe Volumes, *hath been given the* Breviate *and Subſtance of ſuch Philoſophical Writings, as came abroad, and were thought of good worth. And all along we have interſpers'd many Hiſtories, Philoſophical Obſervations and promiſcuous Experiments.*

And now, I think, we may take our Proſpect, and ſee, that we have got more ground in our ſecond Volume than in the firſt; and more yet in the third than in either of the former; whence we take the liberty to ominate well for the future. Yet in all this I aſſume nothing to my ſelf, but give all what is due to the merits of my generous Correſpondents. And all that have affections for Arts and Sciences may rejoyce to ſee the late Proficiency of the Ingenuous and Nobler Students in both our famous Univerſities, *and in all the Univerſities of Chriſtendom. The Ingenious* French *have drawn the ſame Yoke with us, in publiſhing their* Journal des Scavans; *and the* Romans *have followed our Example in their* Giornale de Letterati. *And doubtleſs all* Civil *Nations, who have a Guſt for uſeful knowledge, will, in good time, drive on this Example; and then, as the Light increaſeth, and runs on, we ſhall in a like proportion become ſo many mutual Ayds to each other: And this will hopefully redound to the General good of Mankind.*

I doubt not but the Reader *will pardon the Prolixity of this* Preface, *ſince, as was promis'd, it is not onely Preface, but bears a part of my main buſineſs, which is, to excite and animate the Induſtry and free Communications of others; of ſome of whoſe Effects take for the preſent the* Specimens *following.*

The Deſcription

Of an Inſtrument invented divers years ago by D^{r} Chriſtopher Wren, *for drawing the Out-lines of any Object in Perſpective.*

SEe *Fig.*^{I}. wherein *A.* is a ſmall *Sight* with a ſhort arm *B.* which may be turn'd round about, and mov'd up and down the ſmall Cylinder *CD.* which is ſcrew'd into the piece *ED.* at *D.* this piece *ED* moving round about the Center *E*; by which means the *Sight* may be remov'd either towards *R* or *F*.

EF is a *Rule* faſtn'd on to the two *Rulers GG*, which Rulers ſerve both to keep the ſquare Frame *SSSS* perpendicular, and by their ſliding through the ſquare holes *TT*, they ſerve to ſtay the *Sight*, either farther from or nearer to the ſaid Frame; on which Frame is ſtuck on with a little wax the paper *OOOO*, whereon the Picture is to be drawn by the *Pen* I. This Pen I. is by a ſmall *Braß-handle V*. ſo fixt to the *Ruler HH*, that the point I. may be kept very firm, ſo as alwayes to touch the Paper.

HH. is a *Ruler*, that is alwayes, by means of the ſmall ſtrings *aaaabbbb*, mov'd *Horizontally*, or *Parallel* to it ſelf; at the end of which is ſtuck a ſmall Pin, whoſe head *P* is the *Sight*, which is to be mov'd up and down on the *Out-lines* of any Object.

The Contrivance of the *Strings* is this. The two Strings *aaa, bbb*. are exactly of an equal length. Two ends of them are faſtn'd into a ſmall Leaden *Weight Q Q*, which is mov'd in a *Socket* on the back ſide of the Frame, and ſerves exactly to counterpoiſe the *Ruler HH*, being of equal *weight* with it. The other two ends of them are faſtn'd to two ſmall Pins *H.H*, after they have been roled about the ſmall *Pulleys N, MM. LL. KK*; by means of which *Pulleys* if the *Pen* I. be taken hold of and mov'd up and down the Paper, the Strings moving very eaſily, the *Rule* will always remain in an *Horizontal* poſition.

The manner of Uſing it is this: Set the *Inſtrument* on a Table, and fix the *Sight A*. at what height above the Table, and at what diſtance from the Frame *SSSS*, you pleaſe. Then, looking through the Sight *A*, and holding the Pen I. in your hand, move the Head of the Pin *P*. up and down the Out-lines of the Object, and the point I. will deſcribe on the Paper *OOOO*, the Shape of the Object ſo trac'd.

An Obſervation

of Saturne, *made at* Paris, *the* 17th *of* Auguſt, 1668. *at hor.* 11½, *at night, by* M. Hugens, *and* M. Picart; *as 'tis deſcrib'd in the* Journal des Scavans *of Febr.* 11. 1669.

THe Obſervers, imploying a Teleſcope of 21 Foot, ſaw the Planet *Saturn*, as 'tis repreſented by *Fig*. II. the Globe in the midle manifeſtly appearing both above and below beyond the Ovale of his Anſes; which was hardly diſcernable the laſt year.

They meaſur'd divers ways the Inclination of the *Great Diameter* of the Ovale to the *Equator*, which (Inclination) was found c [illegible] t *Nine* degrees, although at that time it ſhould not be but c [illegible] degrees, according to what M. *Hugens* hath affirm'd in I [illegible] eme of *Saturn, viz.* that the Plan of the Ring, which en- [illegible] the Globe of this Planet, is inclin'd to the Plan of the *Ecliptique* but 23 *deg*. 30. *m*. But this laſt Obſervation and other like ones of this and the precedent Year being more exact, and made at a time more proper for meaſuring that obliquity, than were thoſe, which had formerly ſerved for a foundation to determine it; M. *Hugens* finds, that, in ſtead of 23. *deg*. 30. *m*. the Angle of the Plans of the Ring and of the Ecliptique muſt be of 31. *deg*. or thereabout; and that being ſo, that not onely the Shape, which *Saturn* hath at preſent, but alſo all thoſe, that have been noted ſince the true ones were obſerved, do perfectly agree with the *Hypotheſis* of the Ring; and particularly that of 1664. in the beginning of *July* *, which was made, and made publick by *Signior Campani*, wherein the Great Diameter is double to the Leſſer.

As to the round *Phaſis* of *Saturn*, that Change of the Inclination, which was juſt now ſpoken of, cannot alter the time of it but very little or nothing; ſo that M. *Hugens* ſtill exſpects this Apparance in 1671. when in the Summer of that Year *Saturn* will begin to looſe his *Anſes*, there being then to remain onely the Globe in the Midle; and will not recover them but about a year after, according to what he hath ſaid in his Book of the *Syſteme* of *Saturn.*

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* See *Fig*. 3. as 'tis to be found in the *French* Letters, writ en by M. *Auzout* to M. L'*Abbé Charles*, and printed at *Paris*, A. 1665. upon the occaſion of the *Ragguaglio di due Nuove Oſſervationi da Giuſeppe Campani*.

An Extract

Of M. Dela Quintiny's *Letter, written to the* Publiſher *in* French *ſometime agoe, concerning his way of Ordering* Melons; *now communicated in* Engliſh *for the ſatisfaction of ſeveral curious Meloniſts in* England.

I Shall now anſwer to that particular of your Letter, which concerns *Melons*, as exactly as I can. All the *Seeds*, I ſent you, produce *Melons* with a thin and ſomewhat embroider'd skin, not divided by Ribbs: Some of them have their skin whitiſh, others of the Colour of *Slate.* The Melons themſelves are not very great, their fleſh very red, dry, melting upon the tongue; not mealy, and of a high taſte. And theſe are the two onely kinds, which, after I have tried above an hundred different ſorts, I make uſe of, and ſend you, not having obſerv'd any change in them, after the uſe of 20 years.

As to the *manner* of *cutting* them, you know, that the firſt thing appearing of them, are two Leaves united, here called *Ears* (mark't in *Figure* IV. by 1.1.) Out of the midſt of theſe two Ears there ſhoots, ſome days after, firſt one Leaf, which we call the *firſt* Leaf or *Knot* (mark't 2.) and out of the ſame place, after ſome days more, ſhoots a *ſecond,* call'd the *ſecond knot* (mark't 3.) Out of about the midſt of the Stalk of this ſecond knot ſhoots the *third knot* (mark't 4.) And this *third* knot it is, which muſt be cut at the place markt *6.* without hurting the branch of the ſecond knot, whence this third came; becauſe that from that place will ſpring a branch, which we call the *firſt Arm,* and this Arm will ſhoot forth firſt one knot, then a ſecond, then a third; and this third it is, you are to cut again in the ſame manner, as was ſaid before. And you muſt be careful to cut theſe *third* knots, without ſtaying for the ſhooting of the *fourth* or *fifth* ones. You'l ſee out of every knot come forth Arms or Branches like to the *firſt,* ſpoken of before; and it is at thoſe Arms, that the Melon will be produced. And they will be good, if the foot or root be well nouriſh't in good earth, and cheriſh't by a good hot-bed and the Sun. But let the foot of the Melon never paſs into the dung, nor the earth be water'd but moderately, when you ſee it grows too dry, ſo as the ſhoot might thereby ſuffer; which yet you muſt not delay, till it happen, leſt the remedy come too late. I water twice or thrice a week in very hot weather, and that about Sun-ſet; and I cover my Melons with a Straw-mat from eleven of the Clock in the fore-noon to two in the after-noon, when the heat of the Sun is too violent, and too quickly conſuming that little moiſture, which is neceſſary for the root. And when it raineth, I cover alſo my Melon-garden, leſt too much wet hurt my fruit. There is ſome ſubjection in this, but 'tis alſo a pleaſure to thrive in working by Rule.

If the root produce too many branches or arms, cut away the weakeſt of them, and leave none but 3. or 4. of the ſtrongeſt and moſt vigorous, and ſuch as have their knots neareſt to one another. When I tranſplant my Melons from the Nurſery-bed, I put commonly two roots together, except I find one very ſtrong, which I then plant alone, cutting from it neither of the branches that ſhoot from each ſide (mark't 7.7.) betwixt the one Ear and the Leaf before ſpoken of. But when I joyn two roots together, I quite cut away both the branches, that ſhoot from the two Ears, ſtanding one over againſt the other, to avoid the diſordering abundance of branches; which alſo would wrong the foot.

The Melons being knit, I leave but *two* of them upon each foot, chuſing thoſe, that are beſt placed, and next to the firſt and principal Stalk, that is, to the heart of the foot. I alſo take care, to leave none but fair ones, and ſuch as have a ſhort and thick tail. The foot alſo of your Melon muſt be ſhort, well truſs'd, and not far diſtant from the ground. Melons of a long ſtem, and having the ſtalk of the Leaf too long and ſlender, are never vigorous, and cannot yield good Melons.

It happens ſometimes, that at the very firſt there ſhoot out from between the two Ears, *two* Leaves, though I above ſpoke but of *one*; but this happens but ſeldom; and when it does, ſuch two leaves muſt be reckon'd but for one knot; and afterwards there will ſhoot out a ſecond, then a third, &c. and ſo on to 25 or 30, if you be not careful to cut in time: And it is at the extremity of thoſe branches ſo diſtant, that Melons will grow; but they cannot be good, becauſe they are ſo far from the place, which affords them their nouriſhment; and their Juyce is alter'd by the length of its paſſage through the branches, which the Sun ſpoileth; whereas the foot of the Melon being ſhort and well truſs'd, there are always leaves covering the branches and even the Melons themſelves, until they be near ripe.

Too great heat parches them too much to take nouriſhment well; and this you muſt take care of. He that is curious, muſt every day walk often in his Melon-garden, to cut off all the branches, which he ſhall obſerve to be uſeleſs, or hurtful. You'l find of them to ſhoot forth almoſt to the Eye, and they are capable to alter all, if it be not remedied in time.

I muſt not forget to tell you, that from the midſt betwixt the two Ears and the two firſt Leaves there ſhoots out yet one branch more, which ought to be kept, if vigorous, but cut, if weak.

In the *Figure* I have mark'd a Leaf with 5, ſhooting out from the midſt of the fourth knot: I might have mark'd more, coming forth ſucceſſively from one another, as you ſee the fourth come from the third, &c.

We may perhaps the next Moneth *impart to the Reader another Letter from the ſame Generous and Intelligent perſon, upon the ſame Subject.*

An Account of two Books.

I. *Renati Franc. Sluſii* MESOLABUM.

SEU

Duæ mediæ Proportionales inter extremas datas per Circulum & per Infinitas Hyperbolas vel Ellipſes, & per quamlibet exhibitæ.
Ac Problematum omnium Solidorum effectio per eaſdem Curvas.
Acceßit pars altera de Analyſi, & Miſcellanea. Leodii Eburonum 1668. in thin 4°.

THe *Argument* the Title declares to be the ſame with that in the Geometry of the famous *Des-Cartes*; *viz.* That Ancient Probleme of finding *two Means*, of *Doubling the Cube*,

which

which troubled all *Greece*. The Solution of which Probleme in Geometry may be compared to that with the giving of the *Cube-root* of any Number propoſed in *Arithmetick :* For, in Arithmetick, the firſt of two continual Proportionals between an *Unit* and *any Number* propoſed, is the *Cube-root* of that Number, and the Unit in Arithmetick is repreſented by a Line in Geometry, which is one of the Extreams.

Concerning this Probleme, the *Author* declares himſelf to be none of thoſe, that ſearch for that which cannot be found, to wit, to perform it by *Right Lines* and a *Circle.* 'Tis true indeed, it may be ſo done, to wit, by tryals and profers ; as, who cannot in that manner divide an Arch into three Equal parts ? But ſuch *Mechaniſmes* are accounted *ageometrick* ; and ſuch operations may be well reſembled to the vulgar Rule of *Falſe Poſition* in Arithmetick, which cannot give an abſolute true Reſolution of one of the meaneſt of Queſtions, when the thing ſought is *Multiplex* of it ſelf, or Involved ; for inſtance, what Number is that, which multiplyed in it ſelf makes 9 ; who knoweth it not to be 3 ? But who can find it to be abſolutely ſo by the aid of the ordinary rules of *Falſe Poſition,* wherein the Extraction of a *Square Root* is not preſcribed ?

The Author obſerves, that amongſt thoſe, that ſolve this Probleme by the *Conick Sections,* they ſeem to have afforded fewer Effections thereof, than there have been Ages, ſince it was firſt propoſed. Very few by ayd of a *Circle* and an *Hyperbola* or *Parabola :* by a *Circle* and *Ellipſis* none, that he could obſerve to have been publiſhed.

The which the Author conſidering, and ſtudying how to ſupply, he found out not onely one, but infinite ſuch Effections, and that not in one Method, but many ; following the guidance of which Methods, by the like felicity he hath conſtructed all ſolid Problems infinite ways, by a *Circle* and an *Ellipſis* or *Hyperbola.*

1. His general Methods for finding two Means, by a *Circle* and either an *Hyperbola* or *Ellipſis,* are laid down in Prop. 1, 2, 16, and in this 16 Prop. he ſheweth to do it with *any Ellipſis* and *a Circle.*

2. Particular Effections for finding but one or both of the

Means, and Doubling the Cube, in Prop. 3. to 6.

3. And albeit all *Cubick Æquations* may be ſolved, either by the finding of *two Means*, or the *Triſection of an Angle*, yet he ſhews the Extent of his Method, in finding out other Infinite ways for the doing thereof, from Prop. 7. to 12.

4. The *Triſection* of an *Angle* by a *Circle* and *Hyperbola*, Prop. 13. and by a *Parabola* in ſtead thereof, Prop. 15. And the finding of *two Means* by a *Circle* and *Parabola*, Prop. 14.

In the Second part of his Book *De Analyſi*, the Author firſt gives you the *Analyſis* or *Algebra*, whereby all his *General* Methods of finding *two Means* were invented. And afterwards, for the advancement of Geometry, gives you the *Analyſis*, that relates to his *particular* Methods, as in caſe you would find but one of thoſe Means, and afterwards by an eaſie operation the other. After that, he comes to ſhew, how the Effections or Delineations for *Cubick Æquations* were invented; And then, how thoſe Conſtructions for the *Triſection* of an *Angle* were found out: the uſe whereof is, to give Lines in a known meaſure, equal to the quantity's ſought, whereby either to give aid in the eaſie obtaining the firſt and ſecond figures of the root, or controul the ſame.

Laſtly, he comes to treat of *General* Conſtructions for the reſolving of all *ſolid* Problems, without reduction of the Æquations propoſed; and ſheweth a *general* Conſtruction for all *Cubick* and *Bi-quadratick* Æquations by ayd of a *Circle* and a *Parabola*, letting *Ordinates* fall from the points of Interſection on ſome Diameter of the *Parabola* (which is always parallel to the *Axis*,) whereas *Des Chartes* letting thoſe *Ordinates* always fall upon the *Axis*, was forced to prepare and alter the Æquations by driving out or taking away the ſecond term (which is next the higheſt,) that the ſum of the *Negative* roots might be equal to the ſum of the *Affirmative* ones, as his Conſtructions always require.

But how to find out all the variety's of ſolving all *Solid* Problems by the *Conick Sections*, hear the *Author* to the *Reader*: *Methodum non adſcripſi, tum quod gratius ac utilius futurum arbitratus ſum, ſi eam ipſe privato Studio, ex hiſce Speciminibus eliceres, tum etiam quod judicium tuum de tota re præſtolarer, Decrevi enim,* *ſi favor tuus accedat, non ipſam methodum tantum, ſed & alia, quæ ſimul obſervavi, brevi; Deo bene juvante, cenſuræ tuæ ſubmittere.*

We come next to ſpeak of the laſt part of the Book, to wit, his *Miſcellanea*, and becauſe it falls in here ſomewhat properly, we therefore firſt mention his fourth Chap. *De Maximis & Minimis*, from which he derives this Propoſition;

If any Magnitude (or Number, as the whole) be divided into ſuch parts, that are to each other as a Number to a Number, the Product of thoſe powers of the parts, that are of the ſame degree, as the parts themſelves denominate, is the greateſt of all Products of the like powers of the parts of the ſame magnitude when otherwiſe divided.

Concerning the Propoſition the *Author* ſaith thus; *Liceret hujus Propoſitionis Uſum prolixius extendere ad determinandas nempe maximas & minimas applicatarum in Curvis, tangentes, & ſimilia; verum cum hanc materiam nuper in Exercitatione ſua Geometrica feliciter aggreßus ſit Vir Clariſſimus* Michael Angelus Riccius, *doctrina & humanitate ſingulari, orbi literato notißimus, & juſti operis ſpem faciat; fruſtra nunc pluribus inſiſterem, cum meliora & perfectiora ab ipſo propediem expectari debeant.*

That exercitation of *Riccio* hath been lately re-printed for *Moſes Pitts*, Book-ſeller in *Little-Britain*, (and is annexed to *Mercator*'s *Logarithmotechnia*) wherein the *Author Riccio* promiſeth a new Rank of *Conical Solids*, which cut, do exhibit thoſe *Infinite Parabola*'s *and Ellipſes*, whereby all Æquations may be eaſily reſolved and determined. But the Learned and Modeſt *Sluſius* in a *private* Letter concerning theſe matters, and *Riccio*'s before-mention'd *Geometrical Exercitation*, ſaith ſomewhat more. *Diu eſt etiam ex quo eandem materiam aggreſſus fueram, qua Methodo, videbis in* Miſcellaneorum meorum *Cap. 4. ubi Propoſitionem univerſalem demonſtravi, ex qua omnia deduci poſſunt; non tamen deduxi, ne viro amico, qui hanc materiam jam occuparat, & a quo multa ac præclara expectari poßunt, occaſionem bene merendi de Rep. literaria præriperem.*

Concerning the reſt of the *Miſcellanies*; Our Author in the 1. *Chapt.* treates *De Infinitis Spiralibus, & ſpatiorum, ab iis &*

Radio Circuli comprehenſorum, menſura. Concerning which he tells you, that *Archimedes* ſquared that *Spiral*, which was made by an equal motion both in the *Radius* and *Circumference* of the Circle: that *Stephano Angeli* hath done the like, when the Motion in the *Radius* is equal, but in the *Circumference* according to any degree of Acceleration; which gave him occaſion to render this Doctrine eaſie and Univerſal by reducing it to one *Analyſis*, when the motion is accelerate according to any degree either in the Radius or Circumference; and hence reſolves this Probleme; *In Circulo deſcribere Spiralem ex talibus motibus compoſitum, ut Circulus ad Spatium ſpirale habeat rationem datam numeri ad numerum.* And applies the ſame Doctrine in

Chap.3. to another ſort of *Infinite Spirals.*

Chap. 2. He treats *De menſura ſpatiorum, curva & recta Contentorum, & eorum Centri Æquilibrii*; applying the former *Analyſis* or *Algebraick* Calculation thereto.

Chap. 5. Treats *De Puncto flexus contrarii in Conchoide Nicomedis prima:* which Point he determins by the Interſection of a *Parabola*, whoſe *Axis* is ſituated in the ſame Line with that of the *Conchoid*; or by a *Cubick Parabola*, whoſe *Axis* is parallel to the *Baſe* of the *Conchoid*, and *Vertex* the ſame with the *Pole* of the *Conchoid*; and hence invents innumerable other *Conchoids* of like properties, and finds the Curve, paſsing through thoſe points of flexure, that are made by *Infinite Conchoids*, deſcribed about the ſame common *Pole* and *Baſe*, which in the *Common Conchoids* he finds to be the *Perimeter* of the *Cubick Parabola* here mentioned: But in his own *new Conchoids*, it is the antient *Ciſsoid*, extended beyond a Quadrant and running *Aſymptotick:* And he finds alſo the round Solids made by the Rotation of theſe infinite Curves, and of the *Ciſsoid* Line, about their *Baſe* Lines or *Aſymptotes* equal to finite Solids.

Chap. 6. The Author conſidering, that *Vincenzo Viviani* in his Book *De Maximis & Minimis* found, that if there were innumerable *Parabola's* deſcribed, having the ſame *Axis* and *Vertex* common, if from any point in that *Axis*, the ſhorteſt Lines were drawn to thoſe *Parabola's*, all thoſe points of Incidence would fall in an *Ellipſis*; and the Authors Analyſis taught him, that the *Prop.* was Univerſal, whereſoever the point be aſſigned, from which the leaſt lines are to be drawn ; which he hath extended, and applyed to thoſe infinite ſorts of other *Parabola*'s.

Chap. 7. Treats *De Figurarum dimenſione ex dato Centro Æquilibrii:* This he ſaith is accurately handled by the Learned already ; *Aliquot tamen modos adſcribit, ut non difficiles, ita nec inutiles ad inveſtiganda Æquilibrii Centra:* which may be applyed to good uſe ; for, in any Curve, if there be *Ordinates* enough given, ſtanding erect at an equal parallel diſtance, you may approach the *Area*, and if by ayd thereof, you find the Center of Gravity, then do you obtain the meaſure either of the *Round Solid*, or *Spindle* made by the Rotation of the given Figure, or of *Hoofes* raiſed upon it as a Baſe.

Chap. 8. The Author ſheweth an eaſie way of finding the Center of Gravity of an *Hyperbolical Conoid*, and that in order to the reſolution of this Probleme ; *Locum invenire, ad quem ſunt omnia Centra Conoidum Hyperbolicarum, quæ fiunt ab Hyperbolis in dato Cono recto ſectis, & quarum Axes ſint Axi ejuſdem Coni paralleli* ; which he finds to be an *Hyperbole*.

Chap. 9. He treats of the *Center* of *Gravity* of the *Lunula* of *Hippocrates Chius*, and ſheweth, that if *Hippocrates* had given that, as he did the *Quadrature* of the *Lunula*, he had ſquared the *Circle*.

Chap. 10. Treats of Arithmetical Problems, wherein he aſſerts, that *Diophantus* was wont to ſolve *Arithmetical* Queſtions with great ſubtilty, but uſeth numbers only, whereas the ſame may often be more eaſily and univerſally ſolv'd by *Algebra* ; and takes for examples, the third Queſtion of the Fourth Book, which he reformes, and reduceth divers of the like kind, that *Bachet* hath added, to one Propoſition and Reſolution ; the 44th of the Fourth Book of the ſame *Diophantus*, which being ſolved with much trouble, he ſheweth to have a briefe *Analyſis* ; the 13th of the third Book, and the 36th of the fourth Book, by reaſon of the likeneſs of it's Operation with the former.

Thus we have given an account of the Authors Book. What Repute he hath among the Learned, needs not to be inſiſted on. The famous *Paſchal* or *Dettonvile* in a Letter to this *Author*, ſaith, (to give it in *Engliſh*;) I believe, that to make it known, that 'tis *You*, who hath found (for Example) this *Parabola*, which is the Place, that gives the Dimenſions of the Surfaces of the Solids of the Cycloid about the *Baſe*, it muſt be I, that muſt tell the World ſo; as well as the other Wonders of your *New Analyſis*, and ſo many other things, which you have done me the honor to impart unto me, with that goodneſs you are pleas'd to have for me, *&c.*

The Book here commended is the Second Edition of the *Meſolabe* of this Excellent Geometer, our Author; Concerning whoſe *firſt* Edition thus ſaith *Stephano Angeli* pag. 217. *Acceſſionis ad Stereometriam & Mechanicen.* Quomodo autem *hujuſmodi Problemata Solida conſtruantur, edoctum fuit a quam plurimis; ſed Herculeas metas in infinitum tranſcendit Nobiliſsimus & Clariſsimus Geometra* Renatus Franciſcus Sluſius *Leodienſis, in ſuo admirabili Meſolabo, in quo hac infinitis enucleat modis.*

Concerning *this* Book, we find it to be the judgement here, (and doubtleſs it will have the ſame eſteem elſewhere among the Learned) that in it there is the moſt excellent Advancement made in this kind of *Geometry*, ſince the famous Mathematician and Philoſopher *Des Cartes*.

II. *Tractatus de CORDE; item de motu & Colore SANGUINIS, &c.*

A. Richardo Lower, *M. D. Londini in* 8o, *impenſis* Jacobi Alleſtry, 1669.

THe Learned Author of this Treatiſe (a Member of the *R. Society*) conſidering with himſelf, how important it was, for the attaining a full knowledge of the Nature and Qualities of the *Blood*, to inveſtigate, beſides the *Circular Motion* thereof, the *Origin* and *Celerity* of that Motion, and the various *Changes* thereof, together with the *Cauſes* of them; as alſo, to make an eſtimate of the Quantity of that Liquor emitted at every Pulſation; thought it very well worth while, to give, from his own beſt Obſervations, a clear and particular account of that whole matter. And for as much as he conceives, that the *Motion* of the *Blood* depends on that of the *Heart*, he begins with a Diſcourſe concerning the *Situation* and *Structure* of the *Heart*, to

ſhew,

ſhew, How exactly theſe two are calculated for its Motion, and how well adapted to diſtribute the Bloud into the parts of the whole Body.

In the *Firſt Chapter* then, he conſiders the *Diverſity* of the *Situation* of the Heart in *different* Animals, and the Reaſon thereof; proceeding to diſcourſe of the *Pericardium* and its Uſe, together with the Origin and Vſe of the *Serum* therein; and why in *Man* onely that *Caſe* of the *Heart* grows to the Midriff, and what makes it to do ſo; as alſo, why the *Cone* in an *Humane* Heart bends much more to the Left ſide, than in *Brutes*: Then ſhewing, that *Arteries* have their riſe *from* the Heart, but *Veins* terminate *in* it, and how and by what Veſſels the Heart is nouriſht by the Alimentary Juyce: treating alſo of the *Veſſels* of the Heart, its Nerves, and the various Influx of the Animal Spirits through the Nerves into the Heart, according to the various ſhapes of Animals, together with the Cauſe thereof: Proving further, that the ſubſtance of the *Heart* is perfectly *Muſcular*, and in perfection ſurpaſſing all other Muſcles of the Body (where he exſpatiates into un-common Obſervations concerning *Muſcles* in *general*;) then deſcending to a Minute Explication of the parts of the Heart, and there particularly ſhewing the *Mechanical* Contrivance of the Heart for its *Syſtole* and *Diaſtole*, together with an accurate deſcription of the *Foramen Ovale*, and its Vſe in the *Fœtus*, and the Clauſure of the ſame in Animals born.

In the *Second Chapter* he treats of the *Motion* and *Office* of the Heart; Where, as he admits not of any *Ferment* or Ebullition of the Bloud in the Heart (which he affirms would be an Obſtacle to its *Syſtole*, as 'tis needleſs to the *Diaſtole*,) ſo he aſſents, that the Motion of the Heart depends not from ſuch an Ebullition (which he proves by Experiments, and vindicates from Objections;) but that the genuine and immediate Inſtruments of the Heart's Motion are its Fibres, Nerves, and Spirits flowing through them, the action of the Heart being altogether conform to that of other Muſcles: Where he takes occaſion to make it out, that the Motion of Muſcles is not cauſ'd by their being *inflated*, nor by any *Exploſion* of the Spirits paſſing through them, but after the manner, as two men taking one another by their hands draw themſelves

ſelves cloſe together into mutual embraces: Whence he goes on to ſhew, That the whole Motion of the Heart conſiſts indeed in the *Syſtole*, that of the *Diaſtole* being onely a *Motion* of *Reſtitution*. Further, that there is a neceſſary Commerce betwixt the *Heart* and *Brain* (the Cauſe of all Senſe and Motion:) but that both ultimately depend from the *Stomack*, as the conſtant *Purveyor* and Furniſher of Matter for Bloud and Spirits.

In the *Third Chapt.* he teacheth, with what *Celerity* all the Bloud paſſeth through the Heart, and what *difference* there is between the *Venal* Bloud and the *Arterial.* As to the *former,* he calculateth, that all the Bloud paſſeth through the Body, thirteen times, (not *Six*, as 'tis miſprinted in the Book it ſelf) in *one* hour. And concerning the *latter*, he is of opinion, that the *Purpureous* and florid color of the Blood in the Arteries proceeds not from its *Accenſion* in the Heart (if there be any ſuch thing) but depends altogether from the *Lungs*, and the *Admixture* of the *Air* with the *Bloud* there: which he proveth by conſiderable Experiments; refuting withal the opinion of thoſe that will derive it from the *Comminution* of the Bloud in the Lungs.

In the *Fourth Chapt.* he gives an Accompt of the Riſe, Progreſs and Uſe of the Invention of *Transfuſing* Bloud out of one Animal into another: though in the Hiſtory of this particular he commits (I know not by what over-ſight) a miſtake, in relating, that *Monſieur Denys* (call'd by him *Dionyſius)* arrogateth to *himſelf* that Invention, whereas he onely tells us that ſome of his Nation do ſo. Beſides which, we muſt needs take notice of another miſtake in this part of the Book, *viz.* that the Author taking occaſion to ſpeak of the *Philoſ. Tranſactions*, calls them the Tranſactions of the *Society*; which certainly he would not have done, if he had either but taken notice of what is ſaid in *Numb.* 11. of the ſame; or elſe conſider'd, that ſo Illuſtrious and ſo Learn'd a Body would certainly, if they thought fit to publiſh any thing as theirs, entertain the knowing World both with ſublimer Matter, and with a ſutable Eloquence: But this *by the by.*

In the *Fifth Chapt.* he treats of the *Chyle*, and its Change into Bloud; where he obſerveth, that nothing paſſes from the *Spleen* through the *Vas breve* into the *ſtomack*; but that the *Ferment* of the ſtomack proceeds immediately from the Blood it ſelf: Explaining further, How the *Separation* of the *Chyle* is perform'd in the *Inteſtins*, and how the ſame, to facilitate the more its paſſage, is diluted and refined by the Iuyce of the *Pancreas*, ſecreted into the *Duodenum*: Rendring alſo the Cauſe, Why all the *Glanduls* in the *Abdomen* and in all the lower parts of the Body do depoſite their *Lympha* or Juyce into the Common great *Receptacle* of the *Chyle*, and Why that Receptacle is plac'd between the *Tendons* of the *Daphragime*; as alſo, Why thoſe Channels, which convey the Chyle into the *Subclavial* Vein, are double. To which he adds, That all the Chyle is by the *Ductus Thoracicus* alone tranſmitted into the Bloud and Heart, which he proveth by ſeveral conſiderable Experiments, with ſome reflexion on the *Bilſian* Experiment alledged for the contrary. All which he concludes by ſhewing the degrees and ways of Change, whereby the Chyle is at laſt converted into Bloud; and how it ſerveth for the *Nouriſhment* and the ſeveral parts of the Body.

The Whole receives a ſingular Elucidation and Ornament by the Accurate *Figures*, in *6. Tables* annexed.

Many Curious and important Obſervations are occaſionally interſperſed; ſuch as are: That the Capillary veſſels (of the ſame ſort) do open into one another in all the parts of the Body: That all the Muſcles of the Body, are *Biventers* or double-belly'd: That as the Motion of the Heart and Bloud is Circular, ſo the Fibres, as the Moving *Engines* of them, are about the *Cone* of the Heart brought into a Circle and Center: That the Motion in the Muſcles is not like *Shooting*, but *Fencing*; and many more, for which we muſt referr to the Book it ſelf.

FINIS.

LONDON,

Printed by *T. N.* for *John Martyn*, Printer to the *Royal Society*, and are
to be ſold at the *Bell* a little without *Temple-Bar*, 1668.

Numb. 46.

PHILOSOPHICAL TRANSACTIONS.

April 12. 1669.

The Contents.

Promiſcuous Additions to what was formerly publiſh't concerning Vegetation. *Some inſtances, ſhewing the Correſpondence of the* Pith *and* Timber *with the* Seed *of the Plant; as alſo of the* Bark *or Sap in the Bark with the* Pulp *of the Fruit. An Extract of a Letter, giving further directions about* Melons. *A ſummary account of the* Rules of Motion, *by M.* Hugens. *A narrative concerning the Reſolution of* Æquations *in* Numbers, *by M.* John Collins. *An Account of two Books,* I. PRÆLUDIA BOTANICA Roberti Moriſon, *M. D.* II. CL. SALMASII Præfatio in librum de HOMONYMIS HYLES JATRICÆ: Ejuſdem de PLINIO IUDICIUM. Divione, *A.* 1668. *in quarto.*

Promiſcuous additions, made by Dr. Tong, *to what was communicated by the ſame in* Numb. 43. *and* 44. *concerning Vegetation.*

1. FOR perfecting the experiment of *Sap*, and to find out, whether it aſcends more or leſs in the prict't Circles of the Body, then in thoſe betwixt the Body and Bark; let the tree, exempted from all its ſap the day before, be firſt peirced with an Auger, only through the Bark, and the quantity of Sap it yeilds, exactly meaſured and weighed: Then at the ſame time let alſo another hole be bored into the

Body of the tree about 1½ inch deep, and ſo round, on every ſide of the ſame tree, and of others of the ſame ſort, (all exhauſted of their ſap the day before) ſome deeper and ſome ſhallower, with a good large Auger; and one quite through, ſloaping. From this experiment, after divers and various trials, may be found the difference of the Sap riſing on the North and South in Sun and ſhade, and ſo likewiſe from that which comes from the Bark, and that which aſcends in the inner part of the tree. The weight alſo may be compared of that, which iſſues from the Bark, with that which iſſues from the Body. The internall heart-ſap may alſo be drawn apart, by boring a *Smaller* auger-hole in the midle of a *Greater*, and fitting it with a long pipe adjuſted into the inner orifice. If no difference be found in theſe, by diſtillation after fermentation, nor otherwiſe, the preſumption will be greater, that the difference of *Heart* (as when they call *Heart* of *Oak*) and Sap in Timber is not from the plenty or ſcarcity of ſap, but from the ſeaſon of felling.

2. From the obſervation of the woody Circle or pricks in the Branch, Arm or Body of a tree, it may be inquired, whether at ſuch time when that Circle firſt encompaſſ'd next the bark, the tree be or be not more ſubject to corruption, than at another ſeaſon, when the jelly of the juyce is grown more condenſed? I am inform'd by a curious and intelligent perſon, that the corruption of the Timber depends not upon the time of the year, and the aſcent, or the plenty or ſcarcity of Sap ſo much, as upon the ſeaſon of the Moon or Wind. And he affirms, that Timber-trees fell'd, when the wind is in the Weſt, eſpecially in the Old Moon, will keep them free from grubs (as they call it) *i.e.* from being worm-eaten; and on the contrary, that when cut down in an *Eaſt* winde, the worm will ſeize on them, in what ſeaſon of the Moon ſoever it be fell'd: To prevent which corruption, 'tis adviſed, that ſuch timber ſhould be forthwith thrown into water. It's indeed worth inquiring, whether we may not aſcribe ſomthing of the durableneſs of timber to the perfect condenſation of the outward integument or coat, and ſo take care, that when trees are to be fell'd for timber or other durable materials, the outward coates may be of ſolid wood.

3. *Ethelbert Jay*, an ingenious and expert planter in *Lemſter*, ſuppoſeth, that the fitteſt time to inoculate is preſently after mid-ſummer, becauſe (*ſaith he*) the Sap deſcends; but I ſay, becauſe 'tis then moſt plentiful, and begins to jelly. The ſame adſcribes it to the ſap aſcending, to take the bud inoculated *before* mid-ſummer; and to the Sap deſcending, to take it *after* mid-ſummer. The time he limits to a few days before mid-ſummer, and to 8. or 10. dayes after it. Mr. *Auſtin* limits 14 dayes before, and as many after; and would have the bud unty'd after 14. days, as I remember.

4. It is all one, whether the Sap be exhauſted below, by being converted into wood, roots, or other uſes; or by diverſion, as when the branch is cut, or the bark opened below: The Sap in both caſes deſcends or rather ſinks indifferently to ſupply the defect, and heal the wound; and ſo it coms to paſs, that there being about mid-ſummer the greateſt plenty of ſap in apple-trees, a bud then inoculated will thrive, eſpecially before mid-ſummer; for then it drawes its ſhare in the Sap aſcending, and, all the neceſſary uſes of the upper branches being ſerv'd, it partakes of the flood of the abounding and ſuperfluous Sap, remitted to it from them.

5. Hence I conclude, that to gird a tree at a convenient diſtance above the inoculated bud before mid-ſummer (ſo as is practiſed to ſtay the bleeding of Vines, to gird them below) is an experiment worth trying; that we may know, whether it will cauſe a ſtronger ſhoot of an inoculated bud or no? Or whether it be better, to cut off the head of the ſtock above the inoculated bud; which my friend informes me will make a better ſhoot, than in the uſual inoculation, if this be done a few dayes before mid-ſummer. Further, when you gird, it muſt be tryed in ſeveral trees, whether girding long before mid-ſummer will not ſtay the aſcent of the ſap, and cutting of the head, much more? Whereby time may be gained by retarding the ſeaſon of inoculation, to their benefit, who have very many to inoculate; and in wet ſeaſon to ſtay for dry weather, onely fit for this work.

6. If then the Sap in it's ſubſiding be ſo conſiderable in the matter of inoculation, it ſeems, that inoculation will hold beſt

and

and longeſt in ſeaſon in the Root. For I have obſerved the Sap to ſubſide unto the Roots out of the Body at ſuch times of the day and year, when in the Branches I found none to ſpare.

7. If Binding, or Cutting off the Head advances the ſhoot of the inoculated bud, then it ought to be experimented, Whether diſbarking a few days before Midſummer on the contrarie ſide, a little below the bud, and having wax apply'd or clay on the part disbark'd, may not by that direction of the Sap, neceſſitating it to paſs by the bud, further its growth conſiderably; or, which is better, a gaſh cut in the wood in that place.

8. To make a barren Tree beare again, cheriſh, dung in trenches, and pare and renew the extremity's of its longeſt Roots, and cut off the outermoſt and ſhorteſt, neareſt the Body. Hence it may ſeem, that Plowing helps Fruit-trees.

9. Croſſe hackings promote fruitfulneſs, cure the *Phyllomania,* whereof the reaſon ſeems to be, that (as was above intimated) Outward Circles and Bark feed the Wood, and the Inner onely reach out to the uttermoſt ſpriggs of the laſt year, to which the Fruit is appendant. For, ſome Trees bear only on this years ſhoot, and ſome only on that of the laſt, poſſibly ſome only on the third years ſhoot; and ceaſe bearing, when they ſhoot no new ſpriggs. Seaſonable baring the Roots, which they call *Ablaqueation*, probably hath the ſame effect, becauſe it hinders the nouriſhment eſpecially of the outward coates, and of barke, leaves, and ſuckers: But, becauſe it ſeems, that, as ſome ſuckers or ſhoots, lately ſprung in outward coats, robb the fruit of the riſen Iuyce, ſo later roots, come from the outward parts of the maine roots, rob them alſo of their firſt nouriſhment in the earth; they ought to be pruned, as well as all ſuckers and not-bearing branches and ſpriggs, every year. For which reaſon alſo, the better to increaſe and amend fruit, it may be obſerved, what was recommended above to the 15th *Querie*, viz. The applying of dung and other amendments in trenches nigh to and beyond the fartheſt points of the Roots, to draw them out of the ſhade and drops. To this end, Diſtance and ſituation is to be obſerved.

10. One of the beſt ways of obtaining the greateſt ſtore of Sap in the ſhorteſt time from the Body of any Tree, is, Not only to pierce the Bark, nor to cut the Body with a chizel, almoſt to the Pith, (as ſome have directed,) but quite thorow all the Circles and the inner Rind it ſelf, on both ſides of the Pith, leaving only the outermoſt Circle and the Bark on the North-Eaſt-ſide unpierced. But this hole is to be bored ſloaping upwards, as large as the biggeſt Auger, you can get, will make; and that alſo thorough and under a large Arm near the ground. So will it not need any ſtone to keep open the orifice; nor Spigot, to direct the Sap into the Receiver. This way, the Tree will in ſhort time afford liquor enough to brew with it. And with ſome of theſe ſweet Saps one buſhell of Malt will make as good Ale, as four buſhels with ordinary water, though you ſhould brew even in *March*, held the propereſt time for brewing in regard of the goodneſs of the water at that ſeaſon. *Sycamore* I take to yeild the beſt brewing Sap, being very ſweet and wholeſom.

11. To preſerve Sap in the beſt condition, for Brewing, what you gather firſt, muſt be inſolated by a conſtant expoſure of it to the Sun in Glaſſes or other fit veſſels, till the reſt be gather'd and ready; otherwiſe it will ſoon contract an acidity. Having been thus expoſ'd to the Sun, till a ſufficient quantity is collected; put into it ſo much very thin cut and hard toſted but no ways burnt Ry-bread, as will ſerve to ferment it; and when it works, take out the Bread, and botle the liquor, ſtopping it up with waxed Corks. If you bake *Sage* or any other Medicinal herbs in ſuch thin Ry-paſte, till they be very dry, you may expect a very wholeſome drink. If you put a few *Cloves* in every Glaſs, into which the Sap runs from the Tree, it will certainly keep a twelfmonth. But I have wonder'd, whileſt I obſerv'd, How ſpeedily it drew the taſt and tincture of the Clove. In ſome few bottles I was ſo happy as to draw out my Cloves, with a cloth, in which I tyed them up, in ſuch a ſeaſon, as not to change colour nor taſte; and yet I preſerv'd the Birch-ſap by that ſlight fermentation above a twelf month without any alteration, which elſe would have ſowr'd in a few days.

12. Some propoſe *Oyle* of *Sulphur* to perfume the Bottles with. I know not, whether that alter the taſt, or onely ſtay the naturall fermentation; or what other change it gives the Sap.

13. *Spirit* of *Wine* ferments the Iuyce of ſome Berries, and poſſibly may not only preſerve but advance the vertue of Saps; a little being powred on the top of them in the botles; or ſome other Oily Spirit.

14. *Raiſins* infuſed in the liquor of *Birch*, is one Ingredient of the *Durham-Gardner.* I have been inform'd, that he uſes *Sugar*; but I beleive, he puts it not in, till he opens a Botle, preſently to be drunk, becauſe it maketh the liquor ſparkle in the Glaſſe.

15. A certain Lady ferments it with Ry-toſt, not put in but only hung over it, in ſuch quantity and at ſuch diſtance, as may give ſome light warmth, motion and alteration to the ſurface of the liquor.

16. I fermented ſome with Ale-barm, which converted my delicat *Birch-Iuyce*, kept in Bottles, into pitifull ſmall beer, which I wondred at; for I know one, who uſed by the barm of Ale to *improve* ſmal Beer, and thereby to keep it the better in Veſſels.

17. I perſuade my ſelf, that *Birch-water* fermented by the *Flemiſh Wheat*-ferment, without any barm, would in time be excellently matur'd in Bottles; but not in a ſmall time.

18. Let *Cynamon* alſo be try'd among the Ferments of theſe Iuyces. *Hony* will not mixe with *Cyder* though boyl'd therein to make Meath; but after a while the Cyder lets fall the Hony, and becomes ſimple Cyder again; Q. Whether it will not be ſo alſo in *Birch ſap*?

19. Some affirm, that the Tops and Leaves of Birch, decocted in the Sap, will preſerve it from Sowring the whole year; and that any ſort of dry'd Aromatick herbs, as *Sage &c.* boyled in beer, will keep it as well as *Hops*, *Ling* (*Heath*) *Broom*, or Worm-wood. I had a friend, who uſ'd *Bay-leaves* in his Beer and Ale. Theſe things I propoſe to tryall, with *green* leaves and tops of *the ſame* year; decoct and *dry* leaves and herbs, infuſ'd or boyl'd, of *former.* The inner Bark yields Oyle, and probably, when infuſ'd, will preſerve Iuyces. So you have Oyle, Vinegar, and Wine from our own native Trees.

20. Delicate and light *French* Manchet, toſted, may poſſibly be alſo good for our Sapps.

21. For the clearing of what was delivered *Num.* 43. p. 858. about *prickt Circles* in Trees, it may be added, That thoſe *Circles* are ſuppoſ'd to be at ſome time of the year of one ſingle row of *pricks*, and at ſome ſeaſon, of more, and at others, of ſolid wood. *Quere*, 1. What alteration is found in Circles of *Pricks*, or *Wood*, in Spring, at Midſummer, and in Autumn *&c*? 2. Whether theſe ſingle or double Circles of pricks and coats of Ielly or wood, increaſe betwixt the inner and outward bark, or not? Or, betwixt the one and both of the barks, *i. e.* on one or both ſides of the inner bark? I conceive, it doth on both ſides of the inner bark, ſo that in ſome thick outward *Barks* thoſe Circles may be obſerv'd, as in *Wood.* 3. Whether the Tree receives increaſe in all its inner coats, ſo as every coat yearly grows thicker, or in the outtermoſt only, or in ſome of the outward coats alſo?

Dr. Iohn Beals *Inſtances*
Promiſed in Numb. 42. *and intended to ſhew the Correſpondence of the* Pith *and* Timber, *with the* Seed *of the Plant; and that of the* Bark *or Sap in the bark, with the* Pulp *of the Fruit, or ſome encompaſſing* Coat, *or Cod, containing the Seed.*

The Author having prefaced, that he can promiſe no Method in the following Communications, gives theſe Inſtances.

Firſt, *ſaith he*, I had an excellent *Summer-Apple*, containing abundance of very pleaſing Iuyce. It was of that kind, which never grows large: The Body by the burthen of the fruit always wreath'd towards the ground; the Branches all curl'd, and full of knots at every turning; and theſe branches apt to grow, if a good knot be ſet in the ground, aſſoon as 'tis cut off, eſpecially about *Candel-maſſe.* This Tree was hollow, and very near all the Timber extremely rotten from the top of the Stem to the root; and every ſprigg, how ſmall however, appear'd Cork-color'd and rotten at the heart of the Timber. And ſo it was generally all over the Roots; and 'tis like, it had been ſo many years before: Yet the Tree bore abundantly

dantly with alternative reſts every ſecond or third year. The fruit had ſcarce any core; the kernels were very ſmall, thin and emptie; nevertheleſſe the branches from the knots grew well enough to repleniſh a Nurſery for me. This ſeems to indicate the Correſpondence between the Pithy part, Heart or Timber, and the Seeds. And more to confirme this; A young tree grew like a Sucker from the only ſound Root of the aforeſaid Apple-tree. This tree grew ſtraiter then others of the ſame kinde uſually do; of which I conceive the cauſe to be this: Suckers are commonly barren a pretty long time; and this continued barren, til the ſtem was ſtrong enough to bear the fruit which loaded the branches. But that, which makes to our purpoſe, is this; All the fruit of this young tree had ful and ſound Kernels; and though it was the ſame fruit, growing from the Root of the ſame tree; yet it ſeem'd not altogether ſo tender, delicious and juycy, as the fruit of the old tree; nor yet was the tree ſo fruitfull. The Sap in the old tree was leſs diverted, it ſeems, to ſuſtaine the life of the timber, which was now conſumed; and thereby was wholy appropriated for the leaf, bloſſom, and the pulp of the fruit. For I do not undertake, that the Sap yeilds no relief to ſuſtain the life and growth of the timber *ordinarily*, and whilſt the timber is entire; but I rather conceive, that there is a more immediate and peculiar relation between the Sap and Pulpous fruit, and the like between the Timber or whole ſtock, and the Root of the Tree, to tranſmit the ſame ſpirit and nature to the Seed of what kind ſoever it be.

Some are of opinion, that there paſſes into the Timber no part of meer Earth to ſuſtain the life and growth of the Plant, but it only feeds on the ſucculent part aſcending by the Roots, and on the Air, and the moiſture, which the Dews of Heaven, the Rainy ſeaſons, and the Air afford. And if we conſider, that ſome lofty trees grow upon the Rocks, where little or no earth can be found; as alſo, how largly the Oak and Pear-tree grows and ſpreads, and how many years the one bears Acorns, the other Pears, ſomtimes to the quantity of yeilding 5. or 6. hogsheads yearly (as I have known them do;) and in compariſon how little waſt of Earth about the roots appears; we may find more cauſe to attribute this large expence of materials to the perpetual ſupply of Moiſture, than of much Earth. I will give you an experiment, which may ſeem to determine the point, though I yet ſuſpend my Judgment.

I took the largeſt of *Kentiſh* Codlins, Pearmains, Pepins and Deuxans; I wither'd them (which may be ſoon done many ways;) and then I cut them in the midle quite through the midſt of the kernels, having carried them ſome dayes in my pocquet: all that ſaw them, took them to be very wood, and they were indeed like very cloſe Cork. And ſome Philoſophical perſons (though I affirm'd no falſhood, but concea'd the whole matter) did upon the view ſpread it abroad, that I had the *Art* of *converting* all *Fruit* into Wood; pulp and kernels and all was wood. The ſame may be done upon Pears, Cowcumbers, Turnips, and all the Grains and Vegetable Seeds, that are ſtuck in them, and are cheriſh'd by a ſupply of Marly Water. Thus I have had the blades of Wheat and the helme of Peaſe grow out of them to the length of a foot, and then by hanging it in a cloſet, all becoms turn'd into wood; and in ſome time after, all is turnd into Duſt and Earth. And as we are well taught by Maſter *Boyle*, that pure Liquids may be converted into Earth; ſo theſe Terreſtrial parts of the Fruit may be from the Liquors thither collected, and derived from the Maſs of the Earth.

But to return to the clearing of the affinities above claimed; I Inſtance in *Berbery* roots, perforated by me, which bore Berries, that had no ſtones at all: And in hollow'd Apple-trees the kernels will be very thin, and empty ſkins, and uncapable of growth. Gardeners tell me, that if you take the hard ſtick out of the root of Parſly, it will bear no kind ſeed. But it may be objected, that a very hollow *Oak* and an hollow *Elme* doe bear pregnant ſeed. I anſwer, that an *Elme* is all Timber to the Bark; and an *Oak*, when 'tis all putrid at the heart, yet may have firm wood enough to convey the Spirit of the root into the Acorn; and the Roots may be ſound, when the Body of the Tree is much decayed by rain, beating in at the lopp'd tops, or by other paſſages through the Bark. We ſee, that *Beans*, *Wheat*, and other Grain grow kindly, if the Eyes and parts next adjoyning be whole, though the *Beans* be full of great holes in other parts, or the main body of the *Wheat* be cut off with Sciſſers.

How-

However, let the objection give us the more Caution, that, if we deſſein to a Fruit without Stones, the perforation may be the bolder and the more compleat.

And to proceed further, ſome Trees are leſſe fruitfull, or altogether barren by the exceſſive growth and firmneſs of the Timber; and theſe are recover'd by croſs deep hackings through the Bark: And ſuch injuries done to the Timber both in the Stem and main Roots, they cleave the Roots, and put a ſtone in the cleft, that it may not cloſe again too haſtily. If this violence be not done both to the Stem and Roots, the remedy may fail. We ſee alſo, that *Vines* are leſs fruitful, when they are permitted to run out into many woody branches.

II. To ſhew alſo the Proximity between the *Sap* of the *Bark* and the *Pulp* of the *Fruit*; I did in Summer-time make Reſts for water on the body of *Kentiſh* Codlin-trees, and cauſ'd water to be frequently powred into thoſe Cavities. The effect was this, the Apples grew to an extraordinary bigneſs, and were very inſipid, and many of them had parts in appearance much like the pulp of *Lemons*: ſome I ſuffered to hang on the Tree as long as they would, and thoſe became full of Spots of the Colour of Corke, or like the rotteneſs of an Apple.

I omit the reſt, and haſten to redouble a remark of the great uſe, which may be made of the cheif Experiment. The *Graft* carries the maſtery from the *Stock* for the *Pulp* of the fruit; So that we have little hope of much change by *meer* Graftings, how oft ſoever iterated. But if after many, and ſtrange, and choice Engraftings you ſet the Kernel, Stone, or Seed of the grafted Fruit in a Kind Mould, you may then expect ſome new or mingled kinde of Plant, as *Semi-Apricocks*, *&c.* And thus the *Almond* and *Peach* may by many changes in the Graftings, and by Inteneration of the Stones of the Peaches, and of the Shels of the Almonds, and by Terebrations of the Stem and Root here and there, alter their guiſes, so that the Coat of the Almond may approach to the Pulp of the Peach, and the kernel of a Peach be enlarged to a kinde of Almond; and great ſtore of better contrivances may from hence take riſe.

Extract of a Letter

Of M. dela Quintinie, *giving ſome further directions and Obſervations about* Melons; *promiſed in a manner in the* Number *next fore-going*

MY great care this laſt Month * hath been, altogether to remove the ſmal feeble branches(on which 'tis not likely that *any* or *any good* fruit will grow) and to leave none but good branches. When-ever you have a Melon, which coms well, knit on a branch, you muſt not fail to cut away the reſt of that branch, on this ſide of the fruit, to the end that all the nouriſhment, that would have been diſperſed into the whole branch, may paſs into that fruit, which is found at the extremity of the branch; taking care notwithſtanding, that the fruit be covered by ſome leavs of the other branches, for its better growth under the ſhade, in thoſe parts where 'tis very hot.

As to the time of the maturity of Melons, I muſt tel you, that I ſhould have begun to eat ſome, 8. or 10. dayes agoe; but that the Seaſon hath been very unkind for 3. months together, a North-winde having reigned all that time, and reigning ſtill, and cauſing cold nights; inſomuch that I have not yet remov'd my Glaſs-bells from them, which elſe I had done 3. weeks agoe. I had knitted ones ſince the end of *April*, ſo that, there commonly needing no more than 40. days from the time of a Melons knitting to that of its ripeneſs, I ſhould have eat of them before this time. But to tel you the truth, I have the advantage of having Melons knit, 3. weeks ſooner, than any body, I know, in this Country.

For the keeping of the Seed, you muſt take no other Seed, but ſuch, as is found in that part of the Melon, which hath been towards the Sun: And at the ſame time you eat the Melons, you muſt well cleanſe ſuch Seeds, and rub them with a linnen cloth, until they be very clean and dry; then putting them up in ſome convenient Cloſet till Seed-time.

Remember, not to eat the Melons but ſome 24. hours after they have been gather'd; putting them in the mean time in a place, neither too hot nor too cold; and free from any dry ſcents, good or ill.

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* *This letter was written June 15th. St. Nov. in Paris.*

Otbſerve alſo, to gather them ſeaſonably, when they are neither too ripe nor too green: which you may know by their Yellowiſh Colour, and by their Taile, commonly ſplitting, and their Smel. A Melon ordinarily requireth one day from the time of its being ſmitten, to that of its being gather'd. I call the time of its being ſmitten, when it begins to ſhew its being ripe by a little Yellowneſs, appearing in ſome part or other of it. This will oblige you, (as I alſo admoniſhed in my former) to walk through the Melon-garden 2. or 3. times a day, mornings, at noon, and in the evening.

A Melon, that ripens too faſt, is never good, ſuch a ripeneſs not being a good one, but proceeding from the poorneſs or ſickneſs of the foot, which maketh it thus turn ſuddenly.

The Melon muſt be full, without any vacuity, which, you know, is diſcern'd by knocking upon it. And the meat muſt be dry, no water running out; only a little dew is to appear, iſſuing out of the Pulp; which muſt be of a very *Vermillon* Colour.

Trouble not your ſelf to have *big* Melons, but *good* ones. Thoſe who covet great Melons, may have their deſires either by ſowing Seeds of the great kinds, or by much watering others: Which watering is a thing, wherein great care and diſcretion is to be uſed. As I have hitherto kept my Glaſſes over my Melons, yet ſo that within this month they are raiſed from the ground to the height of 4. inches, ſupported by ſmal forks; ſo I ſeldom water them, and but little at a time; which is once every Week. In ſhort, you muſt Judge of the neceſſity of watering by the Vigour, which is required in the foot and leaves, without which the fruit cannot be good for want of good nouriſhment.

A Summary Account of the Laws *of* Motion, *communicated by Mr.* Chriſtian Hugens *in a Letter to the* R. Society, *and ſince printed in* French *in the* Iournal des Scavans *of March* 18. 1669. *ſt. n.*

Before theſe *Rules* of *Motion* be here deliver'd, 'tis neceſſary to preface ſomething, whereby the worthy Author of them may receive what is unqueſtionably due to him, yet without derogating from others, with whom in ſubſtance he agreeth. But, foraſmuch as this Subject is of that nature, that all Philoſophy and generally all Learn'd men are therein concern'd, it will be moſt proper, to publiſh theſe *Rules*, as well as we did thoſe of D. *Wallis* and D. *Wren* (Numb. 43.) in the Language of the Learn'd, together with ſome Hiſtoricall paſſages relating thereto: Which we nowdoe, as follows.

C*um noviſſimis menſibus nonnulli e* Societate Regia *in publico ejuſdem Conſeſſu enixius urgerent, ut graviſſimum illud de* Regulis Motus *Argumentum, non ſemel inter Ipſos antehac agitatum, ſed, pluribus aliis intercurrentibus rebus, nunquam, uti par erat, diſcuſſum expenſumve, tandem aliquando Examini rigido ſubjectum conficeretur; viſum equidem fuit Illuſtriſſimo iſti Cœtui decernere, ut quotquot e Sociis ſuis indagandæ* Motus *indoli præ cæteris incubuiſſent, rogarentur, ut ſua in rem illam Meditata et Inventa depromere, ſimul et ea, quæ ab aliis Viris præcellentibus,* Galilæo *puta,* Carteſio, Honorato Fabri, Ioachimo Iungio, Petro Borrelli, *aliiſque, de argumento iſto fuerant excogitata, congerere & procurare vellent; eo ſcil. fine, ut conſultis hoc pacto collatiſque omnium ſententiis illa dehinc Theoria, quæ cum Obſervationibus et Experimentis, debitâ cura et fide crebro peractis, quam maxime congrueret, Civitate philoſophica ſuo Iure donaretur.*

Edito hoc celeuſmate, incitati protinus e dicta Societate fuerunt, inprimis Chriſtianus Hugenius, Iohannes Walliſius, Chriſtophorus Wrennus, *ut ſuas de* Motu *Hypotheſes et Regulas, quibus condendis aliquamdiu inſudaſſent, maturare atque expe-*

dire ſatagerent. Factum hinc, ut ſelectus ille Virorum præſtantiſſimorum Trias, poſt paucarum ſeptimanarum ſpatium, Theorias ſuas, eleganter compendifactas, tantum non certatim tranſmitterent, Regiæque Societatis *ſuper iis ſententiam exquirerent. Primus omnium D.* Walliſius, *ſua de* Motibus æſtimandis Principia, *literis d.* 15. Novemb. 1668. *datis, ejuſdemque menſis die* 29. *traditis et prælectis, communicavit. Mox eum excepit D.* Chriſtophorus Wren, *qui* Naturæ Legem de Colliſione Corporum, *proximo menſe* Decembri, *ejuſque die* 17. *eidem* Societati *publice exhiberi curavit: quæ in mandatis mox dedit (præ-habito tamen utriuſque hujus Authoris conſenſu) ut ad commodiorem horum Scriptorum communicationem, diſcuſſionemque diffuſiorem, res tota typis mandaretur.*

Hæc dum apud Nos geruntur, Ecce adfert Nobis tabellarius d. 4. Ianuarij *inſequentis* (St. Angl.) *Dn.* Hugenii *literas, ejuſdem Menſis d.* 5. (*at* ſt. nov.) *exaratas, ejuſque Scripti, de* Motu Corporum ex mutuo impulſu, *priores Regulas quatuor, una cum demonſtrationibus, continentes. Habebam ego in promptu Theoriæ* Wrennianæ *Apographum, idque actutum eodem plane die, ſic favente Tabellione publico, D.* Hugenio, *redhoſtimenti vice, remittebam, dilata interim literarum* Hugenianarum *(quibus tale quid includi, ob molem, et antegreſſum Authoris promiſſum, ſuſpicabar) reſignatione, donec ferret occaſio Nobiliſſimum et Sapientiſimum Regiæ Societatis Præſidem, Dn. Vice-Comitem Brouncker, compellandi. Quo facto, amborumque Regulis in modo dicta* Societate *collatis, mirus confeſtim in utroque conſenſus effulſit; id quod inſignem in nobis lubentiam pariebat, utrumque hoc Scriptum prælo noſtro committendi. Nihil hic nobis deerat a parte* Hugenii, *quam ejus conſenſus; abſque quo fas nequaquam judicabamus, ipſius Inventum, maxime cum illud haud integrum eo tempore nobis dediſſet, in lucem emittere. Curæ interim nobis erat, ſcriptum Ipſius publicis Regiæ Societatis monumentis inſerendi; ſimul & Authori d.* 11. Januar. *ſolennes pro cordata illa communicatione gratias reponendi; additâ dehinc (die ſcil.* 4. Februarij*) ſollicitâ commonefactione, ut ſuam hanc Theoriam vel* Pariſiis *(quod proclive erat factu in* Eruditorum, *ut vocant,* Diario*) vel hic* Londini *in* Adverſariis Philoſophicis, *inprimendam curaret, vel ſaltem permitteret. Quibus expeditis litteris* *paulo poſt ſecundas accepimus ab* Hugenio, *ſcripti* Wrenniani *de hoc argumento recte traditi mentionem facientes, nil tamen quicquam de ſuimet ſcripti Editione, vel* Pariſiis *vel* Londini *paranda, commemorantes.*

Vnde liquere omnino autumem, ipſum ſibi defuiſſe Hugenium *in illa publicatione maturanda; quin imo occaſionem dediſſe procraſtinando, ut laudatus Dn.* Wren, *pro ingenii ſui ſagacitate geminam omnino Theoriam eruens, in gloriæ, huic Speculationi debitæ, partem jure veniret; cum extra omne ſit dubium, neutrum horum Theoriæ illius quicquam, priusquam Scripta eorum ſimul comparerent, reſciviſſe ab altero, ſed utrumque, propriâ ingenii fœcunditate, pulchellam hanc ſobolem enixum fuiſſe.*

Solvit equidem Hugenius, *ante aliquot jam annos,* Londini *cum ageret, illos de* Motu *Caſus qui ipſi tunc proponebantur; luculento ſane argumento, eum jam tum exploratas habuiſſe Regulas, quarum id evidentiâ præſtaret. At non affirmabit ipſe, cuiquam ſe* Anglorum *ſuæ Theoriæ quicquam aperuiſſe; quin fateri tenetur, ſe ab eorum nonnullis ad communicationem ejus ſollicitatum, nec tamen unquam, niſi nuperrime, ad id faciendum pertractum fuiſſe.*

His itaque veritati et Iuſtitiæ litatis, ipſas jam Hugenii *Regulas ſermone* Latino, *in ampliorem Eruditorum uſum, ſic donamus.*

Regulæ de Motu Corporum ex mutuo impulſu.

1. *Si Corpori quieſcenti duro aliud æquale Corpus durum occurrat, poſt contactum hoc quidem quieſcet, quieſcenti vero acquiretur eadem quæ fuit in Impellente celeritas.*

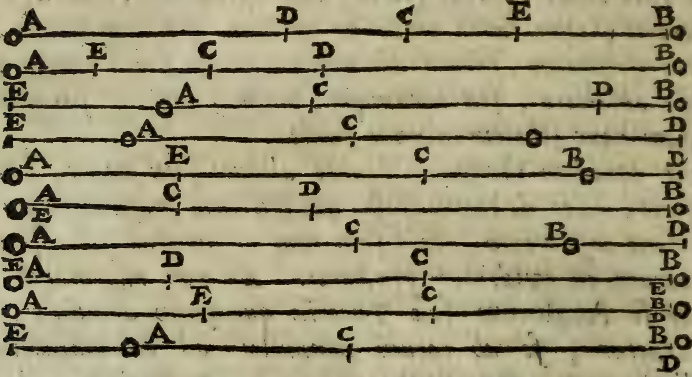
2. *At ſi alterum illud Corpus æquale etiam moveatur, feraturque in eadem linea recta, poſt contactum permutatis invicem celeritatibus ferentur.*

3. *Corpus quamlibet magnum à corpore quamlibet exiguo et qualicunque celeritate impacto movetur.*

4. *Regula generalis determinandi motum, quem corpora dura per occurſum ſuum directum acquirunt, hæc eſt:*

Sint Corpora A et B, quorum A moveatur celeritate A D, B vero ipſi occurrat, vel in eandem partem moveatur celeritate

B D, vel denique quieſcat, hoc eſt, cadat in hoc caſu punctum in B. Diviſâ lineâ A B in C, (centro gravitatis Corporum A B.) ſumatur C E æqualis C D. Dico, E A habebit celeritatem corporis A poſt occurſum; E B vero, corporis B, et utrumque in eam partem, quam demonſtrat Ordo punctorum E A, E B. Quodſi E incidat in punctum A vel B, ad quietem redigentur corpora A vel B.



5. *Quantitas motus duorum Corporum augeri minuive poteſt per eorum occurſum; at ſemper ibi remanet eadem quantitas verſus eandem partem, ablatâ inde quantitate motus contrarii.*

6. *Summa Productorum factorum à mole cujuſlibet corporis duri, ducta in Quadratum ſuæ Celeritatis, eadem ſemper eſt anté et poſt occurſum eorum.*

7. *Corpus durum quieſcens, accipiet plus motus ab alio corpore duro, ſe majori minorive, per alicujus tertii, quod mediæ fuerit quantitatis, interpoſitionem, quam ſi percuſſum ab eo fuiſſet immediatè. Et ſi corpus illud interpoſitum, fuerit medium proportionale inter duo reliqua, fortius aget in quieſcens.*

Conſiderat Author in his omnibus (ut ipſe ait) Corpora ejuſdem materiæ, ſive id vult, ut eorum moles æſtimetur ex pondere.

Cæterùm ſubjungit, notaſſe ſe miram quandam Naturæ legem, quam demonſtrare ſe poſſe affirmat in corporibus Sphæricis, *quæque generalis ipſi videtur in reliquis omnibus ſive duris ſive mollibus, ſive directè ſive oblique ſibi occurrentibus,* viz. *Centrum commune Gravitatis duorum, trium, vel quotlibet Corporum, æqualiter ſemper promoveri verſus eandem partem in linea recta, ante et poſt occurſum.*

An

An Account
Concerning the Reſolution *of* Equations in Numbers, *imparted by Mr.* Iohn Collins.

This Account ſhould have been annex'd to what was diſcourſed of Monſieur *Sluſius* his *Meſolabe* in the precedent Tract, if then we had found room for it. For, the Reader having there underſtood, how farr the *Geometrick* part of *Algebra* is advanc'd by that excellent perſon, 'twas likely, he would be inquiſitive to hear ſomewhat concerning the *Exegeſis Numeroſa*, or the Reſolution of Æquations in *Numbers*. For whoſe ſatisfaction herein, we ſhall here inſert the Account then omitted, being part of a narrative, formerly made by M. *Iohn Collins* touching ſome late Improvements of *Algeqra* in *England*, upon the occaſion of its being alledged, that none at all were made ſince *Des Cartes*.

1. It hath been obſerv'd by divers of this Nation, that in any Æquation, howſoever affected, if you give a Root, and find the Abſolute number or Reſolvend (which *Vieta* calls *Homogeneum Comparationis*) and again give more Roots and find more Reſolvends, that if theſe Roots or rather rank of Roots be aſſum'd in *Arithmetical* progreſſion, the Reſolvends, as to their firſt, ſecond or third differences, *&c.* imitate the Laws of the pure Powers of an Arithmetical progreſſion of the ſame degree, that the higeſt Power or firſt term of the Equation is of. e. g. In this Equation $aaa - 3aa + 4a = N$,

				1.*dif*	2.*dif*	3.*dif.*
If *a* be =	10	Then N. or the Abſolutes or Reſolvends will be found to be	740	218		
	9		522	170	48	6
	8		352	128	42	6
	7		224	92	36	
	6		132			

To wit the 3d. differences of thoſe *Abſolutes* are equal, as, in the Cubes of an Arithmetical Progreſſion.

2. To find, what habitude thoſe *differences* have to the *Coefficient*, of the Equation, 'iſt beſt to begin from an Unit.

3. In any Arithmetical Progreſſion, if you multiply Num-

bers by *pairs*, you ſhall create a rank of Numbers whoſe 2*d*. differences are equal; and if by *ternaries*, then the 3*d*. differences of thoſe Products ſhall be equal. And how to find the greateſt Product of an Arithmetical Progreſſion of any number of terms having any common difference aſſign'd, contain'd in any Number propoſed, is ſhew'd by *Paſcal* in his Tract *du Triangle Arithmetique*, where he apply's it to the Extraction of the Roots of ſimple powers.

4. It appears, How this rank may be caried eaſily by Addition, till you have a *Reſolvend* either equall or greater or leſſe, than that propoſed.

5. When you have a *Majus* and *Minus*, you may interpole as many more termes in the Arithmetical Progreſſion as you will, that is to ſay, Subdivide the Common difference in the Arithmetical Progreſſion, and render it leſſe; and then renew, and find the Reſolvends, which are eaſily obtain'd out of the Powers and their Coefficients, which are ſuppoſ'd knowne, and may be readily raiſ'd from a *Table* of *Squares* and *Cubes*, &c. with which kind the *Reader* may be furniſht in *Guldini Centrobaryca* and *Babingtons Fireworks*: By this means you may obtain divers Figures of the Root; and then the General Method of *Vieta* and *Harriot* runs away more eaſily; and is ſo far improv'd, that after any figure is plac'd in the Root, moſt certain Characters are given to know by aide of the ſubſequent *Dividend* and *Diviſor*, Whether the figure before aſſum'd be too great or too ſmall: or laſtly it may well be concluded, that, as in Logarithmes, when you propoſe ſuch an one as is not abſolutely given in the *Canon*, you doe by Proportional Work, uſing the aid of their firſt differences (when their Abſolute Numbers differ by *Unit*) find the abſolute Number true to 5. or 6. places further than the *Canon* gives it (the reaſon whereof is, that the firſt Differences doe likewiſe agree to about the ſame Number of places;) that I ſay, the like may be done in Æquations, after divers of the firſt figures of the root are found; provided there be the like agreement in the firſt differences of the interpoled Reſolvends.

Moreover we ought here to take notice of a more ſubtile kind of Interpolation, common to all gradual Ranks or Progreſſions of Numbers, wherein Differences happen to be equal: Of which kind the *Reader* may find Examples in *Briggii Arithmetica Logarithmica et Trigonometria Britannica*, relating to Logarithmes, Sines, and the Powers of an Arithmetical Progreſſion: But the method there deliver'd may be rendred more eaſy and general, *viz.* by aid of a *Table* of figurat Numbers, by deriving Generating differences *ſought*, from thoſe *given*; a doctrine, that eaſily flows from *Mercators Logarithmotechnia*, and of uſe in the Caſe in hand, ſhould we ſuppoſe theſe Powers and their Coefficients vnknown, or a *Table* of *Squares* and *Cubes* wanting, and give nothing more, than a few *Reſolvends* belonging to equal Moments or Spaces. And this may likewiſe be of good uſe in *Guaging*, when having the Contents of a Solid, for every 3. Inches, more or leſſe, given, without knowing the dimenſions of the Figure, and even in moſt Caſes, when the differences are Progresſive of one kind, without knowing the Figure it ſelf, having nothing given but its Contents at ſeveral equal Parallel diſtances, each ſuch diſtance may be ſubdivided, and made as many as you pleaſe, and the reſpective Contents found by this general Method of Interpolation.*

After one Root is obtained, the Methods of *Huddenius* and others will depreſſe the Equations ſo as to obtain more, and conſequently all of them.

6. It is eaſy, by a *Table* of figurate Numbers to give the ſum of any ſuch Rank or any term in it relating to a known part of the *Series* of Equals or Roots; but *è converſo*, giving the *Reſolvend* to find the Root, coms to an Equation as difficult as that propoſed; as in D. *Wallis* his Chapter of Figurate Numbers.

7. Some affirm, they can give good Approaches for the obtaining a Root of any *pure* power, *affected* Equation, or for the finding of any of the mean Proportionals in any Rank between two extreams given.

8. Others pretend to have found out a method (incited thereto by an example *in Albert Gerards Invention Nouuelle en Algebre à Amſterdam 1629.*) ſo much, by comparing of Equations, to increaſe

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*Nota. *The Author* (*M.* Collins) *haveing explain'd* Mercators Logarithmotechnia *in Engliſh, and illuſtrated the elegant Doctrine thereof with Examples, hath likewiſe handled this work of Interpolation, and makes the* Logarithmes *true to 25. or 30. places of figures by meer Diviſion (or Proportion;) having herein advanc'd that Author's doctrine thereof by Diviſion, which (as 'tis there illuſtrated) did not* ſeem *to extend farr enough. This hath already been communicated, ſome Months ſince, to ſome of the Members of the* R. Society, *and may be expected hereafter.*

creaſe or diminiſh the unknown Root of Equation, as to render it a whole number (or leſſe differing therefrom, than any Error aſſign'd,) and by *Albert Gerards* Method of *Aliquot parts* to find the ſame, and thereby the Root ſought, although it be a Mixt Number, Fraction, or Surd.

Probably this may ſympathiſe with what is promiſed by the Learned *Huddenius in Annexis Geometriæ Carteſianæ*, where he ſaith, he intended not *then* to publiſh certain Rules, he had ready; whereof one was, To find out all the irrational Roots both of Literal and Numeral Equations. This muſt be underſtood when ſuch Roots are *poſsible*; for 'tis certain, there are infinite Equations, whoſe Roots are no ways explicable, either in whole or mixt numbers, Fractions or Surds, and can be no otherwiſe explain'd, but by a *quàm proxime*.

9. The Author of this Narrative conſidering, that the *Conick Sections* may be projected from leſſer Circles placed on the Sphere, and thence eaſily (otherwiſe than hitherto hath been handled) deſcribed by Points, and that by their Interſections ſome Spherick Problem is determined, accordingly he found, that this following Problem according to the various Scituation of the Eye, and of the Projecting Plain, would take in all Caſes.

The Diſtances of an unknown Star are given from two Stars of known Declination and Right Aſcenſion; the Declination and Right Aſcenſion of the unknown Star is required.

And ſaith, he hath obſerved, that, admitting the Mechaniſme of dividing the Periphery of a Circle into any number of equal parts, or (which is equivalent) the Uſe of a Line of Chords, that this Problem, wherever the Eye be plac'd, may be reſolved by Plain Geometry, and yet the Eye ſhall be ſo plac'd, as to determin it by the Interſections of the Conick Sections; conſequently thoſe Points of Interſection (the Species and Poſition of the figures being given) may be found without deſcribing any more Points than thoſe ſought; and the Lengths of Ordinates falling from thence on the *Axes* of either figure calculated by mixt Trigonometry, and hence likewiſe the Roots of all *Cubick* and *Bi-quadratick* Equations found by *Trigonometry*.

For giving from the *Meſolabe* mention'd the *Scheme* that finds theſe Roots, it will then be required to fit thoſe *Sections* into *Cones*, which have their *Vertex* either in the Center; or an aſſigned point in the Surface of the Sphere, to which they relate as projected, and proceed to the reſolution of the Problem propoſ'd: And how to fit in thoſe Sections, ſee the 7. books of *Apollonius*, *Mydorgius*, the 3d. Volume of Des *Cartes's* Letters, *Leotaudi Geometrica practica*, *Anderſonii Exercitat. Geometricæ*.

As to the Problem it ſelf, it is determin'd on the Sphere by the Interſections of the two leſſer Circles of Diſtance, whoſe *Poles* are the known Starrs. And this Problem hath divers *Geometrick* ways of reſolution.

1. By *Plain Geometry* (in the ſenſe before-mentioned;) Suppoſing a Plain to touch the Sphere at the *North-pole*: if the Eye be at the *South-pole*, projecting thoſe Circles into the ſaid Plain, they are ſtill Circles (by reaſon of the ſub-contrary Sections of the Viſual Cones) whoſe Centers fall in the ſides of the Right-lin'd Angle, made by the Projected *Meridians*, that paſs through the known Starrs; and thus the Problem is eaſily ſolv'd in this manner.

2. If it be required to be performed by *Conick Geometry*; in one caſe it may be done, by placing the Ey at the Center of the Sphere, and projecting as before; to wit, when the longer *Axes* of the figures being produced concur above the *Vertex*; Here the *Problem* is determined by the Interſections of two Conick Sections (whereof a Circle cannot be one, unleſs its Center be in the *Axis* of the other figure.) And in this ſecond Caſe theſe points of Interſection fall in the ſame right line or projected *Meridian*, they did before, but at a more remote diſtance from the Pole-point, to wit, in the former Suppoſition, the Polar diſtance was meaſur'd by a Right line, that was the double Tangent of half the Arch; here it is the Tangent of the whole Arch. Hence it is evident, how one *Projection* may beget another, yea infinite others, altering the Scale; and how the leſſer Circles in the *Stereographick* Projection help to deſcribe the Conick Sections in the *Gnomonick* Projection: But (to reduce the matter to one common *radius*) if we ſuppoſe two Spheres equal, and ſo placed about the ſame *Axis*, that the Pole-point of the one ſhall paſs through the Center of the other, and the Touch-plain to paſs through the ſaid Center or Pole-point, and that a leſſer Circle hath the ſame poſition in the one as in the other; Then, if the Eye be at the South-Pole of the one, it is at the Center of the other; and any projected *Meridian* drawn from the projected Pole-point to paſs through both the projections of theſe leſſer

ſer Circles, the diſtances of the Points of interſection are the Tangents of the half and the whole Arch of the Meridian ſo interſected. But as to the Points of Interſection, which determine the Problem propoſed, they may be found without the aid of the former way, from a *Gnoonmick* and *Stereographick* method of meaſuring and ſetting off the ſides and angles of Spherical Triangles in thoſe Projections, which is neceſſary in what follows.

3. If the Problem is to be perform'd by ***Mixt Geometry***, as by a Circle and either a ***Parabola***, ***Hyperbola***, or ***Ellipſis***, the Circle may be conceived to be the Sub-contrary Section of a Cone projected by the Ey at the ***South-pole***, and any of the reſt of the Sections by the Ey at the Center of the Sphere.

4. If by any of the ***Conick Sections*** however poſited; the projecting Plain may remain the ſame, but the Eye muſt be in ſome other part of the ***Surface*** of the Sphere, and not in the ***Axis***.

Theſe things were mention'd to invite the Learned to their Conſideration: I ſhall only further adde, that we cannot ſay, what may be expected from the labours and endeavors of divers Learned men of this Nation, particularly from Dr. ***Wallis***, who hath ſo excellently reſolved and conſtructed all ***Cubick Æquations*** at the end of the firſt Treatiſe of his ***Opera Mathematica*** by aide of a Cubick ***Parabolaſter***, mentioning, that by ſuch Curves the Roots of all Æquations may be found: And who hath promiſed a Treatiſe of ***Algebra*** and ***Angular Sections***, wherein the Reader need not doubt to meet with ſatisfaction in theſe Myſteries. Nor ought we to omit the mentioning of the Modeſt and Learned Mr. ***Barrow***, who (among many other excellent Subjects, and particularly his Opticks now, at the Preſs) hath perform'd, what the famous Italian Geometer ***Mich. A. Ricci*** hath promiſ'd in ***Exercitat. Geometrica*** (printed at ***Rome*** 1666. and lately reprinted here) about ***Curves*** of ſeveral degrees, that ſerve to determine and reſolve all ***Æquations***: which hath likewiſe been done by other Learn'd men of this Nation.

An Account of Books.

I. PRÆLUDIA BOTANICA Roberti Moriſon *Scoti Aberdonenſis*. Londini, impenſis *Jac. Alleſtry*, 1669. in 8°.

This Prelude of this Excellent Botaniſt hath two parts; The firſt gives us an Alphabetical Catalogue of all the Plants in the

Royal Garden of *Blois* in *France*, as the ſame was enrich'd by the Munificence and Encouragement of the Moſt Illuſtrius Prince *Gaſton*, late Duke of Orleans, with 360 Plants, in the ſpace of five years, by the ſingular care and Skil of our Author; who in this Catalogue hath not only given a ſuccint and pithy deſcription of the Plants here enumerated, but alſo by certain marks diſtinguiſh't the *Perennial* ones from the *Annual*; adding ſome general Obſervations, collected from the Garden abovementioned, very neceſſary and uſeful to all that are ſtudious in Botanicks.

The ſecond, contains ſome Animadverſions not inconſiderable, both on the *Pinax* of *Caſpar Bauhinus*, ſhewing his miſtakes as well in the Digeſting as Naming of Plants; and on the 3. *Tomes* of the *Univerſal Hiſtory of Plants* of *Johannes Bauhinus*.

To which is annexed a *Dialogue* between a Fellow of the *R. Society* and the Author, containing an Anſwer to ſeveral Queries propoſed; where is intimated the beſt General Method taken from Nature it ſelf, of digeſting all Plants, and reducing them to certain *Claſſes* or *Heads* according to the difference of their Seeds, Podds and Flowers; by the advantage whereof the Study and Remembring of Plants may be much facilitated, and the Contemplation thereof among all ſorts of Men exceedingly promoted: For the publiſhing of which kind of Method our Author profeſſeth himſelfe to be already in great forwardneſs, entertaining good hopes, he ſhall by the Aſſiſtance and Encouragement of the Generous, be enabled to give good ſatisfaction to the Curious therein.

II. CL. SALMASII Præfatio in Librum De HOMONYMIS HYLES IATRICÆ: Ejuſdem de PLINIO JUDICIUM. *Divione*, A. 1668. in quarto.

This Book is an Introduction to a large Volume, compoſ'd by the famous *Salmaſius*, and now in the hands of thoſe two Honourable perſons, that have taken care of the Publiſhing of this Preface; both Counſellors of the Parliament of *Burgundy*, Meſſieurs *Lantin* and *De la Mare*; which Volume gives an Account of the many and great miſtakes committed hitherto in the Hiſtory of Plants, upon the ſcore of Naming them: In the doing of which it hath come to paſs, that ſeverall names being often given to one and the ſame Plant, and *vice verſa*, one and the ſame name to different Plants, there hath enſued a great and dangerous confuſion in that large part of the *Materia Medica*, highly requiring to be rectified. Now to that Work this *Preface* prepares the way, by ſhewing to the ſtudious in

Botanicks and *Medicine*, the Argument, Order, and Uſefulneſs of the ſame, interſperſing withall the Cauſes and Origin of thoſe many Errors, which both *A*ntients and Moderns have fallen into upon this Subject; as alſo the negligence of thoſe Antients, the Progreſs of *Phyſick* among the *Romans*; and the Age of the cheif Writers on this Argument: Adding alſo the Authors opinion concerning *Pliny*, what is to be approvd, what to be condemned in him, and how far we are to proceed in the admiration of that Writer.

But the Reader will doubtleſs receive the beſt ſatisfaction concerning this Book, from M. *Lantin* himſelfe, as he was pleaſ'd to give it in a late Letter of his to the Publiſher, accompanying the Preſent, he made of ſeveral Copies of it to the *R. Society*, and to divers particular Members thereof, delighting in Botanical Studies; to this effect.

SIR, I ſend you ſome Exemplars of the Introduction to a great Work, which M. Dela Mare *and I have cauſ'd to be printed, to excite the Lovers of Learning to facilitate the impreſſion of the Whole Book. I promiſe my ſelfe, that this* Preſent *will not be unacceptable to you, as well in reſpect of the Author, who, beſides his great Learning generally known, had the Honour to be lov'd by his* Majeſty *of* G. Brittain, *as for the worth of the Treatiſe it ſelfe; of which you may Judge by this* Preface. *Although it be a work altogether* Critical, *and which, Correcting only Errors about the Names of Simples, may ſeem to contribute but little to the knowledge of Nature, for the Advancement of which your* Illuſtrious Society *mploys all its Studies and Labors with ſo much reputation; yet I may ſay, that even this Book may ſerve for the accompliſhment of that great Deſign, foraſmuch as in diſcovering the Errors and Negligence of the Antients, and of the Moderns that have follow'd them in the Hiſtory of Plants, it ſhews the neceſſity there is to labour after a* new *Natural Hiſtory, that may be free from thoſe defects, if we intend to lay ſolid foundations for knowledge, and particularly for the Art of Medicine. In the mean time, thoſe that practiſe it, being often conſtrain'd to uſe* Simples, *the virtue of which is not known to them but by the Experience of the Antients, may by Ayd of this Book avoid very dangerous miſtakes.*

But what Judgment ſoever you ſhall make both of the Book and its Preface, I ſhall be ſatisfi'd, if you and your Illuſtrious Friends, (to whom I intreat you to preſent ſome of the Copies accompanying this,) ſhall receive them as a mark of my eſteem of the R. Society; *the deſign of which I admire as the Nobleſt, that ever was undertaken by men. I unceſſantly praiſe their Induſtry, Prudence and Sincerity, and infinitely value the parts and knowledge of thoſe, that compoſe it. And this occaſion ſhal alſo ſerve Me to &c.*

LONDON,
Printed by *T. N.* for *John Martyn* Printer to the *Royal Society*, and are to be ſold at the *Bell* a little without *Temple-Bar*, 1669.

Numb. 47.

PHILOSOPHICAL TRANSACTIONS.

May 10. 1669.

The Contents.

Inſtructions concerning the Vſe of Pendulum-Watches *for finding the* Longitude *at Sea; together with a Method of a* Iournal *for ſuch Watches. An extract of a Letter written from Vienna concerning two* Mock-Suns *lately ſeen in* Hungary. *A Relation of the Conferences held in the Royal* Pariſian *Academy for the Improvement of the Arts of* Painting *and* Sculpture. *An Account of ſome Books.* I *INSTITUTIONUM CHRONOLOGICARUM Libri duo, una cum totidem ARITHMETICES CHRONOLOGICÆ Libellis, per* Guil. Beveregium *M. A.* II. *ELEMENTS OF SPEECH; An Eſſay of Inquiry into the Natural Production of Letters together with an Appendix of a Method to inſtruct Perſons Deaf and Dumb; by* William Holder *D. D. &c. III. GVAGING PROMOTED, being an Appendix to* Stereometrical Propoſitions *formerly publiſht by* Rob. Anderſon.

Inſtructions

Concerning the Vſe of Pendulum-Watches, *for finding the* Longitude *at Sea.*

W*Hereas 'tis generally eſteemed that there is no Practiſe for the* Finding of the Longitude *at ſea comparable to that of thoſe Watches, which inſtead of a* Ballance-wheele *are regulated by a* Pendulum, *as* now *they are brought to great perfection, and made to meaſure time very equally; and many perhaps here as* *well as elſewhere being not well verſed in the ordering and managing of that Inſtrument: We thought, it might be no un-acceptable ſervice, to make known ſuch Directions, as may teach the Uſe thereof at Sea. Which we ſhall doe by now giveing you our Tranſlation of thoſe inſtructions, which ſome yeares ſince were made publick by the Worthy M.* Chriſtian Hugens *of* Zulechem, *in the* Belgick *Tongue, as they have been ſince altered or rather* enlarged *by two other Eminent Members of the R.* Society. *And they are theſe;*

1.

THoſe, that intend to make uſe of *Pendulum-watches* at Sea, muſt have two of them at leaſt; that, if one of them ſhould by mishap or neglect come to ſtop, or (being by length of time become foul) need to be made clean, there may likely always remaine one in motion.

2.

The Perſon, to whom the Care of theſe Watches ſhall be committed, is to informe himſelf from the Watch-maker or ſome other, ſo as to underſtand the inward parts of the Watches, the manner of winding them up, and how to ſet the *Indexes*, or *Hands* having the hours, minutes and ſeconds, *&c.*

3.

The Watches on Ship-board are to be hung in a cloſe place, where they may be freeſt from moiſture or duſt, and out of danger of being diſorder'd by knocking or touching.

4.

Before the Watches be brought on ſhip-board, 'tis convenient, they be adjuſted to a *middle* or *mean* day (of which more in the next *Section:*) the uſe of them being then moſt eaſy, it being little or no trouble to the Watchmakers, when they have one that is ſet juſt, to ſet others accordingly: But yet, if time or conveniency ſo to doe ſhould happen to be wanting, they may notwithſtanding be uſed at Sea with the like certainty, provided you know, how much they goe too faſt or too ſlow in 24. hours, as is directed in the next Section.

5.

To reduce Watches to the right meaſure of dayes, or to know how much they goe too faſt or too ſlow in 24. hours.

Here take notice, that the *Sun* or the *Earth* paſſeth the 12. *Signes*, or makes an entire revolution in the *Ecliptick* in 365 days, 5 hours, 49 min. or there about, and that thoſe days, reckon'd from noon to noon, are of *different* lengths; as is known to all, that are verſ'd in *Aſtronomy*. Now between the longeſt and the ſhorteſt of thoſe days, a day may be taken of ſuch a length, as 365 ſuch days, 5. hours *&c.* (the ſame numbers as before) make up, or are equall to that revolution: And this is call'd the *Equal* or *Mean* day, according to which the Watches are to be ſet; and therefore the Hour or Minute ſhew'd by the *Watches*, though they be perfectly Iuſt and equal, muſt needs differ almoſt continually from thoſe that are ſhew'd by the *Sun*, or are reckon'd according to its Motion. But this Difference is regular, and is otherwiſe call'd the *Æquation*, and here you have a *Table*, that ſhows it.

	Januar.		*Februa.*		*Mar.*		*April.*		*Mai.*		*Jun*	
	m.	*ſec.*	*m.*	*ſec.*	*m.*	*ſec.*	*m.*	*ſec.*	*m.*	*ſec.*	*m.*	*ſec.*
1	6	10	0	0	4	46	14	23	19	25	16	24
2	5	47	0	2	5	3	14	39	19	28	16	13
3	5	24	0	4	5	21	14	55	19	29	16	1
4	5	2	0	8	5	39	15	10	19	29	15	49
5	4	41	0	12	5	57	15	25	19	29	15	37
6	4	21	0	16	6	15	15	39	19	28	15	24
7	4	2	0	21	6	33	15	53	19	26	15	11
8	3	44	0	26	6	51	16	7	19	24	14	58
9	3	27	0	32	7	9	16	21	19	21	14	45
10	3	11	0	40	7	27	16	34	19	18	14	32
11	2	55	0	48	7	45	16	47	19	15	14	19
12	2	39	0	57	8	3	16	59	19	11	14	6
13	2	23	1	6	8	22	17	11	19	7	13	53
14	2	7	1	16	8	41	17	22	19	2	13	40
15	1	52	1	26	9	1	17	33	18	57	13	27
16	1	38	1	37	9	21	17	43	18	51	13	15
17	1	25	1	49	9	41	17	53	18	45	13	3
18	1	13	2	2	10	1	18	3	18	39	12	52
19	1	2	2	15	10	21	18	13	18	33	12	41
20	0	51	2	28	10	40	18	23	18	26	12	30
21	0	41	2	42	10	59	18	32	18	18	12	19
22	0	32	2	56	11	18	18	39	18	10	12	8
23	0	24	3	11	11	37	18	46	18	1	11	58
24	0	18	3	26	11	56	18	53	17	51	11	48
25	0	13	3	41	12	15	18	59	17	41	11	38
26	0	9	3	56	12	34	19	4	17	30	11	28
27	0	6	4	12	12	53	19	9	17	19	11	18
28	0	3	4	29	13	12	19	14	17	8	11	9
29	0	1			13	31	19	18	16	57	11	0
30	0	0			13	49	19	22	16	46	11	52
31	0	0			14	6			16	35		

	Jul.		Aug.		Sept.		Oct.		Nov.		Dec.	
	m.	ſec.	m.	ſec.	m.	ſec.	m.	ſec.	m.	ſec.	m.	ſec.
1	10	45	11	7	19	41	29	16	31	13	21	14
2	10	38	11	16	20	1	29	30	31	3	20	44
3	10	31	11	25	20	22	29	43	30	53	20	14
4	10	25	11	36	20	43	29	56	30	43	19	44
5	10	19	11	48	21	4	30	9	30	32	19	14
6	10	13	12	1	21	25	30	22	30	20	18	44
7	10	7	12	14	21	47	30	34	30	8	18	14
8	10	2	12	28	22	9	30	45	29	55	17	44
9	9	58	12	42	22	31	30	55	29	40	17	14
10	9	54	12	57	22	52	31	4	29	23	16	44
11	9	51	13	12	23	13	31	12	29	6	16	14
12	9	49	13	27	23	33	31	19	28	48	15	44
13	9	47	13	43	23	53	31	26	28	30	15	14
14	9	46	13	59	24	13	31	32	28	11	14	43
15	9	46	14	16	24	33	31	38	27	51	14	12
16	9	46	14	33	24	53	31	43	27	30	13	41
17	9	47	14	50	25	13	31	47	27	8	13	10
18	9	49	15	8	25	33	31	50	26	45	12	40
19	9	52	15	26	25	52	31	53	26	22	12	10
20	9	56	15	45	26	11	31	55	25	58	11	40
21	10	0	16	4	26	30	31	55	25	34	11	10
22	10	4	16	23	26	49	31	55	25	10	10	40
23	10	8	16	42	27	8	31	55	24	45	10	10
24	10	13	17	1	27	26	31	54	24	20	9	41
25	10	18	17	21	27	43	31	52	23	55	9	13
26	10	23	17	41	28	0	31	50	23	30	8	45
27	10	28	18	1	28	16	31	47	23	4	8	17
28	10	34	18	21	28	32	31	43	22	38	7	50
29	10	41	18	41	28	47	31	37	22	11	7	23
30	10	49	19	1	29	2	31	30	21	43	6	58
31	10	58	19	21			31	22			6	34

By the help of this *Table* you will always know, what a Clock it is by the Sun preciſely, and conſequently, whether the Watches have been ſet to the right meaſure of the *Mean* day, or no; uſing the *Table*, as follows.

When you firſt ſet your Watch by the Sun, you are to ſubduct from the time obſerved by the Sun, the Æquation adjoyned to that day of the Month in the Table, and to ſet the Watches to the remaining hours, minuts and ſeconds, that is, the Watches are to be ſet ſo much ſlower, than the time of the Sun, as(in the Table) is the Æquation of that day; ſo that the Æquation of the Day, added to the time of the Clock, is the true time by the Sun. And when after ſome days, you deſire to know by the Watch the time by the Sun, you are to add to the time, ſhew'd by the Watch, the Æquation of that day; and the Aggregate ſhall be the time by the Sun, if the Watch hath been perfectly well adjuſted after the meaſure of the *Mean* days; for the doing of which, this will be a Convenient way;

Draw a Meridian line upon a floor (the manner of doing which is ſufficiently known; and note, that the utmoſt exactneſs herein is not neceſſary:) and then hang two plummets, each by a ſmall thred or wire, directly over the ſaid Meridian, at the diſtance of ſome 2. foot or more one from the other, as the ſmalneſs of the thred will admit. When the middle of the Sun (the Eye being placed ſo, as to bring both the threds into one line) appears to be in the ſame line exactly (for the better and more ſecure diſcerning whereof, you muſt be furniſh't with a glaſs of a dark colour, or ſomewhat blackt with the ſmoak of a Candle,) you are then immediatly to ſet the Watch, not preciſely to the hour of 12. but by ſo much leſs, as is the Æquation of that day by the Table. E. g. If it were the 12 of *March*, the Æquation of that day being by the Table, 8 min. 3 ſec; theſe are to be ſubducted from 12. hours, and the remainder will be 11. hours, 51. min. 57. ſec; to which hours, minutes and ſeconds you are to ſet the *Index* of the Watch reſpectively: Then after ſome days you are to obſerve again in the ſame manner, and likewiſe to note the hour, min. and ſec. of the Watch; to which you are to add the

Æquation of theſe days, taken out of the Table; And if the Aggregate doe Iuſt make 12. hours, the Watch is ſet adjuſted to the right meaſure; but if it differ, you are to divide the minutes and ſeconds of that difference by the number of the days between both the Obſervations, to get the daily difference. Let us ſuppoſe, this ſecond Obſervation to have been made the 20. of *March*, viz. 8. days after the firſt, and finding, that the Middle of the Sun being ſeen in the Meridian in the ſame line

	h.	m.	ſec.
with the two threds, as before, the Watch points	11	51	7
The Æquation of the 20 of *March*, by the Table, is	0	10	40
Which being added to the time, ſhow'd by the Watch, gives	12	1	47

If this had been Iuſt 12 hours, the Watch would have been well adjuſted, but being 1. min. 47. ſec. more than 12, it hath gone ſo much too faſt in 8. days. And theſe 1 min. 47. ſec. that is, 107. ſec. being divided by 8, there comes 13⅜ ſec. for the difference of every 24. hours; which difference being known, if you want time, or have no mind to take the pains to adjuſt the Watch to its right meaſure (this being not neceſſary, ſince you may bring it thus on ſhip-board) note onely the daily difference, and regulate your ſelf accordingly, as hath been mention'd. But if you will adjuſt it better, you muſt remove the leſs weight of the Pendulum a little downwards, which will make it goe ſlower; and then you muſt begin to obſerve anew by the Sun, as before. If it had gone too ſlow, you muſt have remov'd the mention'd weight ſomewhat upwards. And this is of that importance in the finding out of *Longitudes*, that, if it be not obſerv'd, you may ſometimes in the ſpace of 3 months miſreckon 7. degrees and more (yet without any fault in the Watches;) which under the *Tropicks* will amout to above 400 Engliſh miles.

Having ſhew'd, How the Watches may be adjuſted at Land, or how their daily difference may be known; next ſhall follow, How the ſame may be done, when a Veſſel rides at anchor, it being hardly feſible when ſhe is under ſaile.

In the morning then, when the Sun is juſt half above the *Horizon*, note, what hour, min. and ſec. the Watch points at;

if it be going; if not, ſet it a going, and put the *Indexes*, at what hour, min. and ſec. you pleaſe. Let them goe till Sun-ſet, and when the Body of the Sun is juſt half under the Horizon, ſee, what hour, min. and ſec. the *Indexes* of the Watch point at, and note them too; and reckon, how many houres &c. are Paſſ'd by the Watch between the one and the other: which is done by adding to the Evening-Obſervation the hours, &c. that the morning-Obſervation wanted of 12. or 24. in caſe the Hour-hand hath in the mean time paſſ'd that hour once or twice; otherwiſe the difference only gives the time. Then take the half of that number, and add it to the hours, &c. of the morning Obſervation, and you ſhall have the hours, &c. which the Watch did ſhow, when the Sun was in the *South*; whereunto add the Æquation in the Table belonging to that day, and note the ſumme. Then ſome days being paſſ'd (the more the better,) you are to doe Iuſt the ſame: And if the hour of this laſt day be the ſame, that was noted before, your Watch is well adjuſted; but if it be more or leſs, the difference divided by the number, elapſed between the two Obſervations, will give the daily difference. And if you will, you may let it reſt there, or otherwiſe, removing the leſſer weight of the Pendulum you may adjuſt it better.

	H.	m.	ſec.		H.	m.	ſec
E. g. Suppoſe *March* 11th in the Morning, when the Sun half appears above the Horizon, the Watch points at	5	30	10		0	10	3
In the Evening, when the Sun appears half ſet, at	5	20	6		11	59	53
To know by the Watch the time elaps'd between both, ſubduct the time of the riſing	5	30	10				
From	12	0	0				
Reſts	6	29	50				
Whereunto adding the time of the ſetting	5	20	6				
There comes for the time elapſed between them	11	49	56	diff.	11	49	56
Whereof the half is	5	54	58		5	54	58
Which added to the time of the Suns riſing	5	30	10		0	10	3
There comes the time of the Watch when the Sun was in the South	11	25	8	diff.	6	5	1
To which adding the Æquation of the 11th of *March*	0	7	45		0	7	45
The Summe is	11	32	53		6	12	46
Seven days after, *viz.* *March* 18, let the riſing of the Sun be obſerv'd, and the Watch point then at	5	19	4		11	58	57
And at his ſetting, let the Watch point at	5	25	2		0	4	55
To find the time elaps'd between them, ſubduct the time of the riſing,	5	19	4	Or.	11	58	51
From	12	0	0		24	0	0
Reſts	6	40	56		12	1	3
To which adde the time of the ſetting	5	25	2		0	4	55
And you'l find the time paſt between them	12	5	58		12	5	58
Whereof the half is	6	2	59		6	2	59
Which adde to the time of the riſing	5	19	4		11	58	57
And you have the time when the Sun was in the South	11	22	3		6	1	56
Whereunto adding the Æquation of *March* 18	0	10	1		0	10	1
The Summe is	11	32	4		6	11	57
Which Summe if it had agreed with the firſt, *viz.*	11	32	53		6	12	46

then had the watch been ſet to the right meaſure; but ſeeing the latter is leſs than the former, the difference being 49. ſec; the Watch hath by ſo much, in 7. days, gone too ſlow; which 49 *Sec.* divided by the number of days, you have 7 *Sec.* for the daily difference; and by ſo much the Watch goes too ſlow in 24. hours.

You may alſo, inſtead of the Suns riſing and ſetting, take two equall Altitudes of the Sun, before and after Noon, and having noted the time given by the Watches at the time of both the Obſervations, proceed with it in the ſame manner, as was Juſt now directed for obſerving the Sun in the Horizon. In either of which ways there may be ſome Error, cauſed by

the

the Suns Refraction, which is inconſiderable, and therefore needs not to be taken notice of.

6.

By means of theſe Watches to find at Sea the Longitude of the Place, where you are.

Give to each of the Watches a name or a mark, as A. B. C; and before you ſet ſaile, ſet them to the time obſerv'd by the Sun in the place, where you are, and whence you are departing, allowing for the Æquation of the day, whereon you make your Obſervation; Which day you are to note, if the Watches be not well adjuſted; otherwiſe it is not neceſſary.

Then afterwards being at Sea, and deſiring to know the *Longitude* of the place where you are, that is, how many degrees the Meridian of that place is more *Eaſterly* or *Weſterly*, than the Meridian of that place where you did ſet the Watches; you muſt obſerve by the Sun or Stars, what time of the day it is, as preciſely as is poſſible, and note at the ſame time, to what hour, minutes and ſec. the Watches doe point (which time, if the Watches be not ſet to the right meaſure, is by the known daily difference to be adjuſted,) adding thereunto the Æquation of the preſent day, which gives you the time of the day, ſhew'd by the Sun, at the place where the Watches were ſet: And if this time of the day be the ſame with that, obſerv'd where you are, then you are under the ſame Meridian with the place, where the Watches were ſet by the Sun; but if the time of the day, obſerv'd where you are, be greater than that ſhew'd by the Watches, you may be aſſur'd, that you are come under a more *Eaſterly* Meridian; and if leſs, you are come under a more *Weſterly*. And counting for every hour of difference of time, 15 degrees of Longitude, and for every minute, 15 minutes or ¼ of a degree, you ſhall then know, how many degrees, minutes, *&c.* the ſaid Meridians doe differ from one another.

E. g. Suppoſe, the Watches A. B. C. were ſet at the place, whence you parted, on the 20 of *February*, to the time of day obſerv'd by the Sun, abating the Æquation of the 20th of *Febr.* (viz 2 min. 28. ſec.) and ſuppoſe that the Watch A. be ſet to its right meaſure; but that B. goes every day 7 ſec. too ſlow, and C. every day 12. ſec. too faſt. Some days after, ſuppoſe the 5th of *May*, deſiring to know the Longitude of the place where you are at Sea, you obſerve the time of the day

h. min. ſec.
there to be —————————————— 5 — 18 — 10
And you find the Watch A. to point at ——— 2 — 6 — 0
But the Watch B. to point at —————— 1 — 57 — 22
Going too ſlow by 7. ſec. every day, which makes in 74. days, (viz.
From the 20th of *Febr.* to the 5th of *May*) — 0 — 8 — 38
Which being added to its own time, gives the ſame
h. min. ſec.
with that of the Watch A, *viz.* ———— 2 — 6 — 0
You find alſo the Watch C to point at ——— 2 — 20 — 48
Going 12 ſec. too faſt every day, which makes in 74. days —————————— 0 — 14 — 48
Which being ſubducted from its owne time gives again ——————— } 2 — 6 — 0
The time of day therefore by the Watches being -- 2 — 6 — 0
Adde thereunto the Æquation of the 5th of *May* - 0 — 19 — 29
And ſo you have for the time of day at the place where the Watches were ſet ——— } 2 — 25 — 29
But the time obſerv'd being ————— 5 — 18 — 10
Exceeds this by ——————————— 2 — 52 — 41
Wherefore the Meridian of the place, where you are May 5th, is more Eaſterly, than the places where the Watches were ſet, by ——— } 2 — 52 — 41
Which being reduced to degrees, reckoning 15 deg. for an hour, comes to ——— } deg. m. ſ. 43 -- 10 -- 15

Tis true, that from the ſame reckoning it may be concluded, that you are 180. deg. more Eaſterly, which happens, becauſe the Hour-*Index* goes round in the ſpace of 12. hours in the Watches; but the difference is ſo great, that one cannot be deceiv'd in it; elſe the Watch might be ſo made, that the *Index* ſhall goe round but once in 24 hours.

7.
To find the time of the Day at Sea.

Since that for finding the *Longitude*, the Time of the day at the place where you are muſt be known (as hath been ſaid above) you muſt have a care to obſerve that time as preciſely as is poſſible. For every minute of time, that you miſreckon, makes a 4th part of a degree in longitude, which amounts, near the Æquator, to above 15. Engliſh miles, but leſs elſewhere. Wherefore to find the time of the day with certainty, you are not to truſt to the Obſervation of the Suns greateſt Altitude, thence to conclude that 'tis juſt Noon, or that the Sun is in the South, unleſs, being betwixt the *Tropicks*, you have it juſt in the *Z*enith. For elſe the Sun being near the Meridian, remains for ſome time without any ſenſible alteration of its Altitude. Wherefore, though the Meridian Altitude may ſerve well enough for knowing the *Latitude* or the Hight of the Pole upon occaſion; yet it will not ſerve for finding preciſely the *Longitude* of that place. Much leſs are you to rely upon the Sea-*compaſſes*, thereby to find the preciſe time of Noon. Neither are the Aſtronomical Rings or other ſorts of Sundyals ſure enough for ſhewing the time to *minutes* and *ſeconds*. But it is better to obſerve the Suns Altitude, when 'tis in the *Eaſt* or *Weſt*, (the nearer, the better:) for being there, its Altitude changes in a ſhort time more ſenſibly than before or after; and thus from the *Hight of the Pole*, and the *Declination of the Sun* the Hour may be calculated; the manner whereof is ſufficiently taught by others; yet by reaſon that this Calculation is ſomewhat troubleſome, and that alſo there may be ſome Errors in the taking of the Suns Altitude, here follows an eaſier way.

8.

How by Obſerving the Riſing and Setting of the Sun, and the Time by the Watches, the Longitude at Sea may be found.

This way doth neither require the Knowledg of the *Hight of the Pole*, nor of the *Declination of the Sun*, nor the *Uſe* of any *Aſtronomical Inſtruments*: Neither can the Refractions of the Sun or Stars cauſe any conſiderable Error; the refraction of the Morning differing but little or nothing from that of the Evening of one and the ſame day, eſpecially at Sea. Thus then you are to proceed;

At the Riſing and Setting of the Sun, when it is half above the Horiſon, marke the time of the day, which the Watches, then ſhew; and though you have in the mean time ſayl'd on, it is not conſiderable. Then reckon by the Watches, what time is elapſ'd between them, and add the half thereof to the time of the Riſing, and you ſhall have the time by the Watches, when the Sun was at South; to which is to be added the Æquation of the preſent day by the Table. And if this together makes 12. hours, then was the Ship at Noon under *the ſame* Meridian, where the Watches were ſet with the Sun. But if the ſumme be more than 12, then was ſhe at Noon under a *more Weſterly* Meridian; and if leſs, then under a *more Eaſterly*; and that by as many times 15. degrees, as that Summ exceeds or comes ſhort hours of 12: as the Calculation thereof hath been already deliver'd.

Suppoſe, e. g. that the Watches A and B, as before, were ſet with the Sun at the place whence you parted, the 20th of *Febr*; and the *Indexes* ſet to the Hour, min. and ſecond, ſhewed by the Sun, abating the Æquation of that day, *viz*. 2. min. and 20. ſeconds; the Watch A being reduc'd to the right meaſure, and B going too ſlow by 7. ſec. a day. Afterwards on the 22th of *May*, deſiring to know the Longitude of the place, to which you are come, you obſerve in the Morning the Sun

	h.	min.	ſec.
half above the Horizon when the Watch points at	2	30	10
And in the Evening, the Sun being half under the Horizon, when the ſame Watch points at	3	8	40
To find the Time elapſ'd between them, ſubducting the time of the Riſing	2	30	10
From	12	0	0
There remains	9	29	50
Adding thereunto the time of the Setting	3	8	40
You have for the time elapſ'd between the Obſervations	12	38	30
Whereof the half	6	19	15
Being added to the time of Riſing	2	30	10
You have the time by the Watch A, when the Sun was in the South	8	49	25

And after the ſame manner you are to ſeek the time by the Watch B, when the Sun was in the South; which let be ——————————————— } 8---38---48

But this Watch going 7. ſec. a day too ſlow, it is retarded in 91. dayes, (from the 20th of Febr. to the 22 of May) 0---10---37

Which therefore added to the ſaid time gives-8---49---25

That is the ſame time given by the Watch A. Now adding to this time of the Watches, the Æquation of the 22th of May ——————————————— } 0---18--10

You have ——————————————— 9--- 7---35

Which is the ſame time of the day with that of the place, where the Watches were ſet when the Sun was in the ſame Meridian with the Ship, or where the Ship was at Noon.

h. min. ſec.

The difference is ——————————————— 2---52---25

Wherefore this laſt Meridian is by ſo much more Eaſterly, than the firſt; which being reduc'd to *degrees* (as hath been

deg. min. ſec.

formerly directed) make ——————————————— 43.--- 6---15

'Tis manifeſt, that by this way you find preciſely enough the Longitude of the place, where you were at Noon, or the Time of the Suns being in the South: which, although it differs from the *Longitude* of the place, where you are when you obſerve the Setting of the Sun, yet you may eſtimate neer enough, how much you have advanc'd, or chang'd the Longitude in thoſe few hours, by the Log-line, or other Ordinary practiſes of reckoning the Ships way; or (which is the ſurer way) by the degrees paſs'd in 24. hours by a former days Obſervation.

You may alſo, inſtead of obſerving the Suns Riſing and Setting, obſerve the Setting firſt, and then next morning the Riſing; marking at both times the Time ſhow'd by the Watches; and find thence, after the ſame manner as before, the Longitude of the place where the Ship was at Midnight.

Finally, you may alſo, inſtead of the Riſing and Setting of the Sun, obſerve before and after Noon two equal Altitudes of the Sun, noting the time ſhown by the Watches, and reckoning in the ſame manner, as hath been ſaid of the Riſing and Setting: Yet it is to be conſider'd, that the Altitudes of the

Sun are beſt taken, when it is about *Eaſt* and *Weſt*, as hath been already intimated. But note, that in Sailing *North* and *South* you make not the Obſervations at the Suns riſing and ſetting, but at its being *due* Eaſt and Weſt.

9.

But you may, eſpecially in ſuch Quarters, as lye farr *North* or *South*, yea and wherever you will, put the Rule here preſcribed in practiſe, by taking 2. *equal* Altitudes of ſome known *Starr*, that riſeth high above the Horizon. For you ſhall thence, according to the mention'd Rule, know at what time by the Watches the Starr hath been in the South; and ſo the *Right Aſcenſion* of that *Starr* being known, as alſo the *Right Aſcenſion* of the *Sun*, you may thence eaſily calculate, what time it *then* was: Which being compar'd with the time of the Watches, as before, ſhall give the *Longitude* of the place where you were, when you had the Starr in the Meridian.

10.

If the Watches, that have gone exactly for a while, ſhould come to differ from one another (as in length of time it may well happen, that the one or the other faile a minute, more or leſs;) in that caſe it will be beſt to reckon by that, which goes faſteſt; unleſs you perceive an apparent cauſe, why it goes too faſt; ſeeing it is not ſo eaſie for theſe Pendulum-Watches to move faſter than at firſt, as it is to goe ſlower. For, the Wire, on which the *Pendulum* hangs, may perhaps by the violent agitation of the Ship come to ſtretch a little, but it cannot grow ſhorter; and the little Weight of the *Pendulum* perhaps ſlip downwards, but cannot get up higher.

11.

When you get ſight of any known Country, Iſland or Coaſt, be ſure to note the *Longitude* thereof as exactly as you can by the help of the Rules here preſcribed. *Firſt*, thereby to correct the *Sea-Maps*, after that the Longitude of a place ſhall have been found at divers times to be the ſame, ſo that you doubt no more of it. For all *Mapps* are very defective as to the Scituation of Places in reſpect of *Eaſt* and *Weſt*, chiefly where Seas are interpos'd. *Secondly*, to be able always to know in the proſecution of your Iourney, how farr you have ſail'd from any place to the *Eaſt* or *Weſt*. And if by any notable miſchance or careleſneſs all the Watches ſhould come to ſtand ſtill, yet you may at any place, whereof the *Longitude* is certainly known, ſet them a going again, and adjuſt them there by the Sun, and ſo reckon the *Longitudes* from that ſame Meridian. For, you are to know, that you are not at all oblig'd to put *one certain* Meridian of any knowne place as a begining of the Longitude-reckoning; this hapening only in *Mapps*, or *Tables of Longitude*: As, when you take for that purpoſe the Meridian of the *Pico* in *Teneriffe*, or that of the Iſlands of *Corvo* and *Flores* (the moſt Weſterly of the *Azores*) or any others. Yet it were very fit, that all *Geographers* agreed and pitched upon one and the ſame *Firſt* Meridian, that ſo all places might be known by the ſame Degrees as well of *Longitude* as of *Latitude*; though in Voyaging it is ſufficient, to obſerve only the difference of Longitudes, beginning to reckon from the Meridian of any place, you pleaſe, as if it were the *firſt*.

12.

If it happen, that being at Sea all the Watches ſtopp, you muſt, as ſpeedily as is poſſible, ſet them a moving again, that you may know, how much you advance from that place towards the *Eaſt* or *Weſt*: Which is of no ſmall importance; ſince, for want of this knowledg, you are ſometimes by the force of *Currents* ſo carried away, that though you ſaile *before the Wind*, yet you are driven a *Stern*; of which there are many Exampl s.

The Method
Of a Iournal for the Watches.

The Watches being diſtinguiſht by marks as A. B. or the like, every day about Noon, or when moſt conveniently you can, obſerve the time of the day by the *Sun*, or by the *Starrs* at night, and ſubduct thence the *minuts* and *ſeconds*, that are adjoyn'd to that day in the *Table*, and write the remainder down in a paper, wherein 9. *Columns* or more are mark't, placing them in the *ſecond* column, having plac'd the *day* of the *Month* in the *firſt*. And at the ſame time write down the hours, minutes and ſeconds of each Watch in a diſtinct Column, all oppoſite one to another. Then in another Column write downe the *difference* between the time taken by Obſervation, and that given by the Watches or one of them. Then, one Column for the *Latitude*: one, for the *Longitude* by the Ordinary way of reckoning: another, for the Longitude taken from the difference between the *time* found *by Obſervation*, and that given by the *Watches*: and at laſt, a large Column to note the Accidents, that befall the Watches, *&c.*

An Extract of a Letter Written by Dr. Edward Brown *from* Vienna *in* Auſtria *March 3. 1669. concerning two* Parhelia's *or Mockſuns, lately ſeen in* Hungary.

I received the account of the *Parhelia's*, ſeen *Ianuar.* 30th laſt, ſt.n. about one of the clock in the afternoon, over the City of *Caſſovia* in *Hungary*. It was communicated to me from a Learn'd Ieſuit, call'd Father *Michel*, who lives at *Preſburg*, but is now in this City. There were two *Parhelia's*, one on each ſide of the true Sun, and they were ſo reſplendent, that the naked Eye could not bear the brightneſs thereof. One of them (the leſſer of the two) began to decay before the other, and then the other grew bigger, and continued well nigh two houres, projecting very long rays from it ſelf. They were both on that part, which was towards the Sun, tinged with a pale yellow, the other parts being ſomewhat fuſcous. There were at the ſame time ſeen ſeveral *Rainbows*, together with the Segment of a great white Circle, of a long duration, paſſing through the two *Parhelia's* and the Sun: and all this at a time, when the Air was almoſt free from Clouds, though here and there were ſcatter'd ſome very thin ones.

A Relation Of the Conferences held at Paris *in the Academy Royal for the improvement of the Arts of* Painting *and* Sculpture, *as 'tis found in the* Iournal des Scavans.

THeſe Conferences are held once in a Month by divers Able Maſters making reflexions and obſervations upon the rareſt pieces in the Cabinet of his Moſt Chriſtian Majeſty, the Eſtabliſher of that Academy. Monſieur *Colbert*, who takes a very particular care to make Arts floriſh in *France*, being pleaſed to viſit thoſe Artiſts ſome while ſince, to ſee what progreſs they made, and having receiv'd an Account of what had been done in their meetings, expreſſed himſelf to this effect, That as 'twas neceſſary, for the Teaching of Arts, to joyn Examples to Precepts, ſo he thought it proper, that from time to time the Works of the moſt excellent Painters ſhould be examin'd, and ſuch Obſervations made thereon, as would informe others, Wherein the perfection of a Picture conſiſts. Which hath been ever ſince practiſed amongſt them, as the beſt means to carry the Art of Painting to its higeſt perfection; ſuch an Examen of the beſt Pictures diſcloſing many ſecrets of that Art, for which there are no Rules; and opening a dore to debate many important queſtions, hitherto not treated of.

In the particulars, which have been made publick, of theſe Conferences, we may find

Firſt, A general *Idea* of the Art of Painting, wherein are conſider'd two principal parts, the one belonging to the *Theory*; the other regarding the *Practice*, and the dexterity of the hand. Where 'tis obſerv'd, that the Authors, that have written of Painting, have not treated of the former part, how conſiderable ſoever that be, in regard of the Diſſein and Diſpoſition of the Pieces.

Next, a Relation of 7. conferences, whereof *ſix* were made upon as many Pieces of *Raphael*, *Titian*, *Paul Veroneſe*, and *M. Pouſſin*, and the *ſeventh* upon that of *Laocoon*. Where are to be met with many curious remarques, and among many others, theſe following.

M. le *Brun* conſidering a Piece of *Raphael*, where is repreſented the Combat of St *Michel* with the *Divel*, obſerves, that the expreſſion particularly depends from the Bodies, which environ the Figures; affirming, that 'tis that, which ſets out the Motion and Action in the figure of St *Michel*, who ſeems to have life in this Piece: For, as if the Air were preſſed by the Weight of the Body deſcending, it cauſeth, whatever it meets with as more light, to be raiſed, and drives it on high with violence.

In another Piece, where *Titian* repreſents the Body of I. *Chriſt* carried to the Grave, M. de *Champagne*, the Elder, obſerves the dexterity of the Maſter in ordering the Colours and the Light. To make the Leggs of the Picture (which firſt preſent themſelves) to ſtand out, he hath wrapped them about with a very white linnen ſheet, and hath cloathed *Nicodemus*, who holds them, with a very vivid and very clear *Lacque*: On the contrary, to ſink the reſt of the Body, he hath ſo taken the Light of the Picture, that the Shadow of *Ioſeph* of *Arimathea*, who helps to ſupport the Leggs, falls on its head and Shoulders; which alſo contributes to impreſs on the Body the image of Death. The Order of the Colours is alſo very remarkable in the Cloaths. For betwixt the Green habit of *Ioſeph* of *Arimathea*, and the Blew Mantle of the Bleſſed Virgin, is the yellow habit of *Magdalen*, wherein what is brown and dusky, is temper'd, and borrows of the different colours about it; that the Eye may paſs by degrees from one of theſe colours to the other. And becauſe the Sleeve of *Magdalen*, which is of a bright yellow, is neer the habit of *Nicodemus*, which is alſo of a lively Colour; the Artiſt, to hinder that thoſe two vivid colours may not entrench on one another, hath turn'd up *Nicodemus's* Sleeve againſt the yellow, ſo that from the Shadow of one of theſe colours one paſſeth to the ſhadow of the other.

The Art of the Picture, ſpoken of in the *fifth* Conference, is no leſs remarkable. In this Piece, done by P. *Veroneſe*, is ſeen a Woman, whoſe Carnation colour is ſo freſh and bright, that it dazleth the Eyes: M. *Nocret* examining, what may cauſe this beauty, obſerveth, that it proceeds in part from hence, that the Maſter hath ingeniouſly drawn *before* this Woman a Child cloathed in brown; *behind* her, a man in black; and on her ſide, a *Negro*, who maketh an admirable Concert with the great luſter and ſplendor of that Carnation.

The two laſt Conferences, treating of two pieces of M. *Pouſſin*, doe furniſh among other things, very elegant Examples of different Characters ſuting different perſons. This Maſter having to repreſent many perſons gathering Manna, gives to them all different poſtures, becomming their humor; on the fore-part of the Picture there are two *youths*, who following the genius of their Age, fight about the *Manna.* Near them are *Men*, gathering *Manna* in the mean time, and eating thereof. A little farther off, appears a *Girle*, who unwilling to take the pains of ſtooping, holds out her coat to receive the *Manna* falling down, and looks on it, as if the Heavens dropp'd it for none but her: Which well expreſſeth (ſays the Obſerver) the Softneſs and diſdainful Temper of that Sexe, which loves not to take pains, and imagines that all muſt come to paſs, as they wiſh. In the other piece, which exhibits the Recovery of the *Two Blind* men, to whom our Saviour reſtored their Sight, there is an *Old* man, who comes very near, peeping, and looking as if he doubted of the truth of the Miracle: in which the Artiſt hath well obſerv'd the genius of Aged perſons, who commonly are more incredulous and diffident than others.

Beſides this, there are examin'd here and there in theſe Conferences divers Queſtions important in Painting; which would be too long to particulariſe in this place.

An Account of ſome Books.

INSTITUTIONUM CHRONOLOGICARUM Libri duo; una cum totidem ARITHMETICES CHRONOLOGICÆ Libellis: per Gulielm. Beveregium *M. A. è Colleg. S. Joh. Cant.* Londini 1669. *in* 4°.

THis Author firſt taketh notice, that though moſt Nations have been diligently endeavoring to render a good account of *Time* (having its Original and Progreſs from the Motions of the Heavens) yet caſting his Eyes upon ſome of the moſt famous Chronologers, as *Scaliger, Petavius, &c.* he found *Chronology* obſcur'd with many intricate Queſtions, fill'd with many knotty Controverſies, ſtuffed with a multitude of uncertain Comments, and deliver'd in ſuch an odd and dark method, that the knowledg thereof was not to be obtain'd without much difficulty, and loſs of Time. Whereupon he declareth his Deſign to be, To deliver the ſame from Controverſy, and only to treat of what concerns meerly the Diſtinction of Time, omitting matters of leſs concernment, and yet nothing of what may be requiſite to *Chronology* it ſelf; in which he *(truly)* aſſerts, That many things, moſt worthy to be known, may be found, for which you may look in vain elſewhere.

And what he performes herein, he doth in a Method different from others, *viz.* meerly by *Arithmetick*, without the aid of *Chronological Tables*; which, even of the beſt Authors, will hardly be found without manifold faults.

In the *firſt* Book he treats of *Time* in *general*; of a Moment, (*de Scrupulo*;) an Hour, a Day, Week, Month: And then of the ſeveral ſorts of Years, the *Celeſtial*, *Iulian*, *Gregorian*, *Ægyptian*, *Æthiopick*, *Perſian*, *Syriack* and *Grecian*; item, the *Aſtronomical*, *Civil*, and *Solar* Year of the Iews, and the *Arabick* year.

In the *ſecond*, the Author (ſhewing good skill in Aſtronomy) treats of *Conjunctions*, and *Eclipſes*, of the *Æquinoxes* and *Solſtices*, the *Circle of the Sun*, and the *Dominical Letter*; the *Circle of the Moon* or the Golden number, the *Roman Indiction*, and *Epacts*; of ſeveral eminent Periods or Revolutions of Time, as the *Metonick*, *Calippick*, the *Dionyſian* and Iulian Period; of ſeveral *Æra's* or fixed Characters of Time, as the *Chriſtian* and *Diocleſian*; of the Age of the World according to the Accompt of the *Græcians*: Moreover of the *Iewiſh Æra*; The Æra or *Ethnick* Accompt from the taking of *Troy*; and the *Antiochenian Epocha*: the *Olympiads*, and *Agones Capitolini*: Of the *Iulian* year, the *Spaniſh Æra*; the *Æra* of the Victory at Actium; the *Epocha* of *Nabonaſſar*; as alſo of the Philippean, Alexandrian, and the Yezdegirdican Epocha; and of the *Mahumetan Æra*, the *Hegira*, or Flight of Mahomet.

In the *Arithmetical* Part, the Author ſhews not only his great skill in *Arithmetick*, even in the Speculative parts thereof, accompanied with good knowledge in the Grounds of *Geometry* but likewiſe his underſtanding of Exotick and Ancient Languages; and, as a Specimen thereof, explains the Common Characters of Arithmetick, as he doth alſo the *Indian*, *Roman*, *Hebrew*, *Samaritan*, *Græcian*, *Syriac*, *Arabick* and *Æthiopick* Characters. And to the End of the *ſecond* Book he hath annexed an *Appendix*, wherein, in *Roman* Letters, he hath explained the *Hebrew*, *Syriack*, *Perſian*, *Æthiopick* and *Arabick* Words for the reſpective Months of the Year, for the ayde of thoſe, that are not ſo much excerciſed in the *Oriental* Languages.

And the Author, finiſhing this Book in the Year 1667. ſhewreth (as a general Example of all his Calculations) in what Yea of all the ſeverall *Periods*, *Æra's*, *Epocha's* and *Accompts* before-mention'd, the *Year* of our *Lord Chriſt* did then happen.

But this is not all, that is to be expected from this Author; ſince himſelf intimates pag. 179. *Sed manum de Tabula; de his enim aliiſque, quæ ad Annos præſertim Menſeſque Orientales pertinent, alibi, Deo volente, fuſius agemus*: Which doubtleſs to the Learned (conſidering what is already publiſh'd by him) will be very acceptable.

II. ELEMENTS *of* SPEECH: *An Eſſay of Inquiry into the Natural Production of Letters; together with an* Appendix *to inſtruct Perſons Deaf and Dumb: By* William Holder D.D. *and Fellow of the* R. Society. London, *by* John Martyn, 1669, *in* Octavo.

TO give the Reader the ſumme of what is ſaid in this well conſidered and uſeful Tract, it is as follows;

Language is a Connexion of Audible Signs, the moſt apt and excellent in whole Nature, for Communication of our Thoughts and Notions, by Speaking. *Written Language* is a Deſcription of the ſaid Audible Signs, by Signs Viſible. The *Elements* of Language are *Letters*, *viz.* Simple Diſcriminations of Breath or Voice, Articulated by the Organs of Speech.

The *Alphabet* conſiſts of ſo many Letters, as there are to be found ſuch Simple Diſcriminations. And the *Written Alphabet* ought to be juſt ſo many ſingle proper Characters, deſign'd to ſignifie the Sound or Power of each Letter. And theſe are the Storehouſe of Nature, the Elements and Materials, out of which all Languages are made. Theſe Letters have their *Material* and their *Formal* Cauſes, and *Organs* proper to each. Their *Matter* is various, *viz.* Breath or Voice, *i. e.* Breath vocalized by the Operation of the *Larynx*. Their *Form* is conſtituted by the Motions and Figures of the Organs of Speech, affecting the Breath or Voice with a peculiar Sound, by which each Letter is diſcriminated.

Now to find out their juſt Number, *Firſt*, Find out the different Kinds of Matter, of which Letters are made; and theſe are in general, *Breath*, when only Spirit or Breath is articulated; and *Voice*, when Articulation is of Breath vocalized: And theſe again, more particularly, are either (after they have paſſed the *Larynx*) only in the *Mouth*; or elſe have paſſage at the ſame time through the *Noſe*. So there are four Kinds of *Matter*, Breath Oral, Voice Oral, Breath Ore-Naſal, and Voice Ore-Naſal.

Next, 'Tis to be examin'd, How many different *Articulations* can be made by ſeveral Motions and Poſtures of the Organs in the Parts of the Mouth; which applied ſeverally to the Kinds of Matter, may make ſeveral Diſcriminations of Sound to the Ear, *i. e.* ſeveral Letters. And of theſe (as to *Conſonants*; *viz.* Letters made by Appulſe) our Author finds, and hath deſcribed 9. And if poſſibly any more may be found out, he judges it to be moſt likely, that they will not recompence the Diſcoverers pains, by being of ready and graceful uſe, but will be fitter to be caſt out among ſeveral others; to which in his Scheme of Conſonants he hath prefix'd an *Obelisk*.

Now by theſe 9 Articulations with Appulſe, there will be fram'd Conſonants *Spirital* 9; *Vocal* 9; *Naſo-ſpirital* 9; *Naſo-vocal* 9; in all 36. Then rejecting thoſe, that prove not graceful; nor eaſie to be pronounced; *viz.* 2 Spiritals, 2 Naſo-ſpiritals, and 6 Naſo-vocals, in all 17; there will remain 19 Conſonants proper for uſe, according to the deſign of Letters. And if thoſe, to whom theſe 19 Conſonants (or about that number) appear'd and ſtood in ſuch confus'd Order, ſome in Ternaries, ſome in Pairs, and ſome Single, were themſelves put into ſo much Confuſion, and ſo puzzled to give a Methodical and Natural Accompt of them, it is no matter of wonder. But now, looking upon them, as they lie in their Original *Differences* and *Combinations*, and as they are ſelected out of a Natural Stock of 9 Quaternions, or 4 Novenaries, 'tis judged, that their Nature and Differences lie moſt plain and obvious to be underſtood.

That which renders this Piece the more commmendable, is its *Uſefulneſs*, to which the Author hath excellently applied his Conſiderations of this Subject; viz. *The inſtructing of Perſons Deaf and Dumb.* In the performance of which, he hath firſt removed the great Objections and Difficulties that lie in the way, and ſeem to diſcourage that Deſign, and to portend it infeſible. Which done, he delivers thoſe particulars, that give encouragement to that Undertaking; which he doth from his own practice therein; it being certain, that ſuch a Work as this, is not to be perfected by Study alone, but muſt and will receive many hints and helps (not to be thought on otherwiſe) whilſt the Endeavour is excited, being under Experiment and Practice.

III. GUAGING PROMOTED, *Being an* Appendix to Stereomatical Propoſitions, *formerly publiſhed by* Rob. Anderſon. *Printed for* Joſh. Coniers 1669. *in* Octavo.

IN this ſmall Tract the Author reduceth his former Doctrine of *Gauging* to farther Practice, and illuſtrateth the ſame by Examples.

And firſt he ſuppoſeth the *Axis* of a *Pyramid*, *Cone*, *Sphere*, *Parabolical*, and *Hyperbolical Conoid*, and of a Figure of different *Baſes*, which he calls a *Fruſtrum* of a *Priſme*, which if round, may reſemble a Drinking Cup like an Horn, having its top ſqueezed into an *Elliptick* form, and the bottom remaining either a Circle, or be likewiſe compreſs'd; the ſaid *Axis* to be divided into equal Segments, and Plains paſſing through thoſe Segments erect to the *Axis*; to divide the above-mention'd Solids into divers Portions or Rings: and upon theſe Foundations, *viz.* That in the *Parabolical Conoid* the *ſecond* differences of the Solid Contents of the whole Figures ſo divided are equal; but in the reſt of theſe Solids their *third* Differences are equal: he hath ſuted his Examples to the *Axes* cut by the ſaid Plains at 3 Inches diſtance from each other, ſhewing firſt the nature of the differences in hand, and then ſome eaſie wayes to attain a firſt, ſecond, and third difference; and how out of them to compute the ſeveral Capacities ſought by Additions of Differences plac'd in ſeveral Columns. Laſtly, He gives directions for the more eaſie Calculation of the ſecond Segments of the *Sphere* and *Spheroid*.

But we muſt not omit to take notice, that this Author, ſpeaking *pag.* 23. of ſuch Elliptick Solids, whoſe *Baſes* are unlike, aſſerts, That every ſuch *Elliptick Solid* is equal to the *Fruſtrum* or *Truncus* of an *Hyperbolick Conoid*, the Circular *Baſes* whereof are equal to the *Elliptick Baſes* of the Solid propos'd; and the Height of the one *Fruſtrum* equal to the Height of the other: the Invention and Demonſtration whereof argues good Knowledge in Geometry.

ERRAT. in N°. 46.

P. 928. l. 1. r. *punctum* D *in* B, *ib.* l. 28. r. *fortiſſime omnium aget.*

LONDON,

Printed by *T. N.* for *John Martyn* Printer to the *Royal Society*, and
re to be ſold at the *Bell* a little without *Temple-Bar*, 1669.

Numb. 48.

PHILOSOPHICAL TRANSACTIONS.

June 21. 1669.

The Contents.

The Generation of an Hyperbolical Cylindroid *demonſtrated, and the Application thereof for Grinding* Hyperbolical *Glaſſes hinted at. Experiments lately made concerning the* Motion *of the* Sap *in Trees. An Extract of a Letter lately written from* Vienna, *about Damps in the Mines of* Hungary, *and their Effects. A Chronological Accompt of the ſeverall Eruptions of Mount* Ætna. *A Relation concerning a Woman, not long ſince open'd at* Paris, *having a double* Matrix. *An Accompt of 4 Books I. THOMÆ HOBBES Quadratura Circuli, Cubatio Sphæræ, Duplicatio Cubi, Confutata à IOHANNE WALLIS &c. II. HISTORIA GERAL DE ETHIOPIA A ALTA; Pelo Padre BALTHASAR TELLES &c. III. AN HISTORICAL ESSAY, Endeavouring to make it Probable, that the LANGUAGE of CHINA is the PRIMITIVE Language; by IOHN WEBB Eſquire. IV. AN EXAMEN of the way of TEACHING THE LATIN TONGUE by Uſe alone.*

Generatio

Corporis Cylindroidis Hyperbolici, elaborandis Lentibus Hyperbolicis accommodati, Auth. *Chriſtophoro Wren L L D.* et Regiorum Ædificiorum Præfecto, nec non Soc. Regiæ Sodali.

SInt (in Fig. *I.) Hyperbolæ oppoſitæ D B, E C, quarum Axis tranſverſus eſt B C, Centrum A, et una ex Aſymptotis G P; item per Centrum ſit O M ducta ad angulos rectos ipſi B C.*

Quare ſi circumducantur Hyperbolæ circa Axin OM, manifeſtum eſt, ex ea revolutione generari corpus Cylindroides Hyperbolicum *cujus Baſes ſectioneſque Baſi paralellæ ſunt Circuli. Dico inſuper, ſi idem corpus ſecetur per Aſymptoton GP, erit ſectio Parallelogrammum.*

Secetur per Axin tranſverſum ſectione circulari BNC; item per O et M in Circulos æquales & æqualiter a Centro diſtantes; item per Axin in figuram Geometricem cujus ſemiſſis eſt BDEC, in cujus plano erit Aſymptotos GP, per quam ad rectos angulos planum BDE ſecetur in plano FHP; jungantur denique HO.

Quoniam Triangulum OGH eſt Rectangulum, Ergo Quadratum OH ſive OD. minus Quadrato OG. eſt æquale Quadrato GH: et quoniam DO parallela eſt ipſi BA, et Aſymptoton ſecat in G, erit (ex proprietatibus Hyperbolæ, quæ in Conicis *demonſtrantur) Quadratum OG unà cum Quadrato AB æquale Quadrato OD, h.e. Quadratum OD minus Quadrato OG æquale Quadrato AB ſive Quadrato AN. Ergo Quadratum GH æquale eſt Quadrato AN. Quare GH et AN æquantur et ſunt ad angulos rectos ipſi GA; idemque demonſtratur de omnibus aliis ſectionibus Baſi parallelis. Quare Cylindroides Hyperbolica rite ſecatur per Aſymptoton in Parallelogrammum q. e. d.*

Corollarium

Hinc patet, in ſuperficie Cylindroidis, *quamvis e duplici flexura conſtet, rectas nihilominus innumeras duci poſſe: Patet etiam, aliam eſſe hujus Corporis generationem, nimir. ex revolutione Parallelogrammi circa Axin manente angulo ad Axin æquali GAO, vel denique manente Linea Generatrice HR immobili, et maſſam volubilem formante aut ſecante. Et ſi acies Dolabri acutiſſima et rectiſſima ita diſponatur ad Axin, ſicut ſe habet Linea Generatrix, rotante interim Mamphure, manifeſtum eſt, Torno tam accuratas poſſe elaborari* Hyperbolas *quam* Circulos, *cum nihil aliud requiratur ad formandam* Cylindroidem *quam ad* Cylindrum, *niſi quod in Cylindris acies dolabri eſt Axi parallela, hic vero inclinata. Itaque notandum eſt, pro Inclinatione Anguli GAO. variari ſpeciem Hyperbolæ; adeoque facilius accommodatur ad datam Hyperbolam quam ut demonſtratione opus habeat: At ſi manente angulo Generatrix magis ad Centrum accedat, exſurgit inde minor Hyperbola, ſed priori prorſus ſimilis.*

Ex hoc Principio fabrifieri jam curavit Ingenioſiſſimus Author Machinam, ſimplicitate ſua perquam commendabilem, cujus beneficio Lentes elaborentur *Hyperbolicæ*. Illius deſcriptionem una cum Icone brevi nos etiam edituros ſperamus.

Experiments Concerning the motion of the Sap *in Trees, made this Spring by Mr.* Willugby, *and Mr.* Wray, *Fellowes of the R. Society: and communicated to the Publiſher of the Inquiries touching that ſubject in* Numb. 40.

1. IN *Birch*-trees the Sap iſſues out of the leaſt twiggs of Branches, and fibres of Roots, in proportion to their bigneſs.

2. In all Trees the Gravity promotes the Bleeding; ſo that from a Branch or Root, that bendes downward, there will iſſue a great deal more Sap, than from another of the ſame bigneſs in a more erect poſture.

3. Branches and Young trees cut quite off when they are full of Sap, and held perpendicularly, will bleed; as we experimented in *Willow*, *Birch*, and *Sycamore*: And if you cut off their tops, and invert them, they will bleed alſo at the little ends. Hence one may conjecture, that the narrowneſs of the pores is not the ſole cauſe of the Aſcent of the Sap; for, Water that hath aſcended in the little glaſs-pipes, will not fall out againe by its own gravity, if the pipes be taken out of the water.

4. Roots of *Birch* and *Sycamore* cut aſunder will bleed both ways, that is, from that part remaining to the Tree, and from the part ſeparated; but a great deal faſter from the part remaining to the Tree. But in a cold ſnowy day the Root of one *Sycamore*, we had bared, bled faſter from the part ſeparated, and ten times faſter than it did in warm weather before.

5. In *Birches* the Sap does not iſſue out of the Barke, be it never ſo thick, but as ſoone as ever you have cutt the Barke quite through, then it firſt begins to bleed.

6. The Bark being quite pared off above an hands breadth round, about ſeverall *Birches*, did much abate the Bleeding of the Trees above the bared places, but did not quite ſtop it.

7. The Sap doth not only aſcend betwixt Bark and Tree,

and in the prick't Circles between the ſeverall coats of Wood; but alſo through the very Body of the Wood. For, ſeveral young *Birches* being nimbly cut off at one blow with a ſharpe axe, and white paper immediately held hard upon the topp of the remaining trunk, we ſtuck downe pins in all the points of the paper as they appear'd wet: and at laſt, when the moſt of the paper became wet, taking it away, but leaving the pins ſticking, we found them without any order, ſome in the Circles, and ſome in the Wood between. And to confirm this further, we cauſed the Body of a Tree to be cut off aſlope, and then cut the oppoſite ſide aſlope likewiſe, till we brought the top to a narrow edge; ordering the matter ſo, that the whole edge conſiſted of part of a coat of Wood, and had nothing of a prick't Circle in it, which notwithſtanding, the Sap aſcended to the very top of this edge, and wetted a paper laid upon it:

8. To find out the motion of the Sap, whether it aſcended only, or deſcended alſo; we bored a hole in a large *Birch*, out of which a drop fell every 4th or 5th pulſe. Then, about a handsbreadth juſt under the hole, we ſaw'd into the Body of the tree, deeper than the hole: whereupon the bleeding diminiſh'd about one half; and having ſaw'd Iuſt above this hole to the ſame depth, the bleeding from the Hole ceas'd quite; and from the ſaw'd furrow below decreas'd about half: and it continued bleeding a great while after at both the ſaw'd furrows, the hole in the middle remaining dry. We repeated this with much the like ſucceſs upon a *Sycamore*.

9. Some Trees of the ſame kind and age bleed a great deal faſter and ſooner than others; but always Old trees ſooner and faſter than Young.

10. A wound, made before the Sap riſes, will bleed when it doth riſe.

11. While we were making theſe Experiments, the weather changed from warme to very cold; whereupon the bleeding in the *Birches*, which begun to abate before, ceaſ'd quite. But all the *Sycamore* and Walnut-trees, we had wounded, bled abundantly; (ſome whereof before bled not at all, and thoſe that did, did ſo but ſlowly;) and ſo continued

night and day, when it froze ſo hard, that the Sap congealed as faſt as it iſſued out. The Cold remitting, the *Birches* bled afreſh, the *Sycamores* abated very much, and the Walnut-trees quite ceaſed.

12. We pierced two *Sycamores* on the *North* and *Southſides*, and both of them from equall inciſions bled a greaſt deale faſter from the *North*-ſides, than the *South*, which is conſonant to the preceding Experiment.

13. We ſet ſeveral *Willows* with the wrong ends downward, and cut off ſeveral *Bryars*, that had taken root at the ſmall ends. This 29th of *May* the *Willows* have ſhot out Branches neare two foot long; and from the top of the Sets, which were a yard high, the *Bryars* have alſo grown backwards from that part, which we left remaining to the roots at the leſſer ends; they have great leaves and are ready to flower.

An Extract of a Letter Lately Written by Dr Edward Browne *to the Publiſher, concerning* Damps *in the Mines of* Hungary *and their Effects.*

SIr, having been lately in the Copper, Silver, and Gold-mines in *Hungary*, I hope ere long to give you a particular account thereof; preſenting this in the mean time concerning *Damps* in theſe Mines; whereof I underſtand, that they happen in moſt of them, that are deep; and that they happen not only in the *Cuniculi* or direct paſſages, where they walk on Horizontally (by theſe Mine-men call'd *Stollen*) but alſo in the *Putei* or Perpendicular Cutts or Deſcents (term'd *Schachts* by the ſame.) They are met with not only in places, where the Earth is full of Clay or the like ſubſtances, but alſo where it is Rocky: and one place they ſhew'd me in the Copper-mine at *Hern-groundt*, where there had been a very pernicious damp, and yet the Rock ſo hard, that it could not be broken by their Inſtruments; but the deſcent was all made by the means of Gun-powder, ram'd into long round holes in the Rock, and ſo blowne up. Another place they ſhow'd me, where there is ſometimes a damp, and ſometimes clear weather. When there is much water in the Mine, ſo as to ſtop up the lower part of this paſſage, then the damp becomes diſcoverable, and commonly ſtrong. I procured one to enter it, till his Lamp went out 4. or 5. times, in the ſame manner as at *Grotto del Cane* in Jtaly.

Damps are not all of the ſame force, but ſome weaker, ſome ſtronger; ſome ſuffocate in a ſmall ſpace of time, others only render the Workemen faint, with no further hurt, except they continue long in the place. The Miners (who think themſelves no Workmen, if they be not able to cure a Damp, or to cure the bad Weather, or make the Weather, as they term it) performe it by perflation, by letting the Aire in and out, and cauſing, as 'twere, a Circulation of it. In the Mine at *Herrn-groundt* they did cure a bad Damp by a great paire of Bellows, which were blown continually for many days. The ordinary remedy is by long Tubes, through which the Air continually paſſing, they are able to digg ſtreight on for a long way without impediment in breathing. For ſome *Cuniculi* are 500. fathoms long; which will not ſeeme ſtrange to any one that ſhall ſee the Mapp of the Copper-mine at *Herrn-groundt* or the Gold-mine at *Chremnitz*. And in the Silver-Trinity-mine by *Schemnitz*, I paſſ'd quite under a great Hill, and came out on the other ſide. At *Windſchach*-mine by *Schemnitz* they ſhow'd me the place, where 5. men and a Gentleman of quality were loſt; for which reaſon they have now plac'd a Tube there. The like they place over all doores, and over all ways, where they digg right on for a great ſpace, and have no paſſage through. At *Chremnitz* they told me, that 28. men had been killed at one time in 4. *Cuniculi*, 7. in each; and in the ſinking of *Leopold's*-pitt, which is 150. fathoms deep, they were much troubled with damps, which they remedied in this manner.

They fixed a Tube to the ſide of the *Schacht* or *Pitt*, from the top to the bottom; and that not prouing ſufficient, they forc'd down a broad flat board, which cover'd or ſtopp'd the Pitt, or couched very near the ſides of it, on all ſides but where the Tube was; and ſo forc'd out all the Air in the pitt through the Tube: which work they were forc'd often to repeat. And now they having divers other paſſages into it, the Air is good and ſufficient; and I was drawn up through it without the leaſt trouble in breathing.

But beſides this miſchief from poiſonous Exhalations, Stagnation of the Air, or Water impregnated with minerall ſpirits, they ſometimes periſh by other ways. For there being in theſe Mines an incredible maſs of wood to ſupport the Pitts and the Horizontal paſſages, (the *Putei* and *Cuniculi*) in all places but where 'tis Rocky, men are ſometimes deſtroy'd by the wood ſet on fire. And in the Gold-mine at *Chremnitz* the wood was once ſet on fire by the careleſneſs of a boy, and 50 Miners ſmothered thereby; who were all taken out but one, that was afterwards found to be diſſolv'd by the Vitrioll water, nothing eſcaping either of fleſh or bones but only ſome of his cloaths. I am *&c.*

Vienna April. 20 1669.

A Chronological Accompt
Of the ſeveral Incendium's *or Fires of Mount* Ætna.

THe preſent Fire of *Ætna*, (whereof there was lately a Relation printed here in the *Savoy*) will make it appear not unſeaſonable to reflect back upon former Ages, and to collect from Hiſtory the ſeverall Eruptions hapned there, together with the times of them, and ſome obſervations recorded by Authors concerning the ſame.

To paſs by what is related by *Beroſus*, *Orpheus* and other leſs credible Authors, about the Eruptions of this Mountain, both at the time of the ingreſs of the *Ionian* Colonies into Sicily, and that of the *Argonautes* (which latter was in the 12th Age before the Chriſtian account;) we ſhall firſt take notice of that, which happen'd at the time of the Expedition of *Æneas*, who being terrified by the fire of this then burning Mountain, left that Iſland; whereof *Virgil* l. 3. *Æneid.* gives this notable deſcription;

Ignarique via, Cyclopum allabimur oris,
Portus ab acceſſu ventorum immotus et ingens,
Ipſe ſed horrificis juxta tonat Ætna ruinis,
Interdumque etiam prorumpit ad æthera nubem,
Turbine fumantem piceo et candente favillâ.
Attollitque globos flammarum, et ſidera lambit.

Interdum ſcopulos, avulſaque viſcera Montis
Erigit eructans, liquefactaque ſaxa ſub auras
Cum gemitu glomerat, fundoque exæſtuat imo.

After this we find in *Thucydides*, that in the 76. *Olympiad*, which is about 476. before Chriſt, there was another Fire, and about 50. years after that, another.

Then, in the time of the *Roman Conſulls* there haped four Eruptions of *Ætna*, recorded by *Diodorus Siculus* and *Polybius*.

The next was in the time of *Julius Cæſar*, related by the ſaid *Diodorus* to have been ſo feirce, that the Sea about *Lipara* (an iſland neere *Sicily*) by its fervent heat burnt the Ships, and kill'd all Fiſhes thereabout.

Another we read of in the Reign of *Caligula*, about 40. years after Chriſt, which was ſo dreadful, that it made that Emperour, then being in *Sicily*, to fly for it.

About the Martyrdome of the Romiſh S. *Agatha* it burned againe very fiercely; though ſome ſay, that by vertue of her interceſſion it was ſtay'd from reaching *Catania*.

Againe it burnt A. C. 812. in the Reign of Charles M.

Then from the year 1160 to 1669. whole *Sicily* was ſhaken with many terrible Earth-quakes, and the Eruptions of the ſame Mountain deſtroyed a vaſt tract of inhabited land round about it, and reacht as far as *Catania*; the Cathedtal of which it deſtroy'd, and the religious men living in it.

Againe, in the year 1284, there happened another terrible fire about the time of the death of *Charles* king of *Sicily* and *Arragon*.

A. 1329 untill 1333. there was another. A. 1408. another.

A. 1444. another, which laſted till 1447.

A. 1536. another, which laſted a year.

A. 1633. another, continuing ſeveral years.

A. 1650. it burnt on the North-Eaſt-ſide, and vomited ſo much fire, that by the fiery Torrents, cauſed thereby, great devaſtation was made, as *Kircher* relates in his *Mundus ſubterraneus*; whoſe aſſiſtance we have alſo made uſe of in the foregoing Chronology together with that of *Philotheus*.

The ſame Author, having been in *Sicily* himſelf, obſerveth, that the people of *Catania*, digging for Pumice-ſtones, do find at the depth of 100 palmes (which is about 68. feet) ſtreets paved with Marble, and many footſteps of Antiquity; an argument, that Towns have ſtood there in former ages, which have been overwhelmed by the Matter caſt out of this Mountain. They have alſo found ſeveral Bridges of Pumice-ſtones, doubtleſs made by the flux of the fiery Torrents, the Earth being very much raiſed ſince.

Now whether theſe Eruptions are cauſed by actual ſubteraneous Fires, lighting upon combuſtible matter; or by Fire ſtruck out of falling and breaking ſtones, whoſe ſparks meet with Nitro-ſulphureous or other inflamable ſubſtances heap'd together in the bowels of the Earth, and by the expanſive violence of the Fire forc'd to take more room, and ſo burſting out with the impetuoſity we ſee; may not be unworthy of a Philoſopher's ſpeculation.

An Account

Concerning a Woman having a Double Matrix; *as the Publiſher hath Engliſhed it out of* French, *lately printed at* Paris, *where the Body was opened.*

This Figure (which in the *Cut* here annex'd is the II.) reprſents the two [*] Matrixes, found *januar.* 6 1669. by *Benoit Vaſſal* Chirurgeon, opening the Body of a woman of 32. years of age, of a ſanguin Conſtitution, and a maſculin port. Theſe two Matrixes were ſo well diſpoſed by an extraordinary contrivance of Nature, that the True one had conceived eleven ſeverall times, *viz.* 7. males and 4. femals, all born at the full time, and all perfectly well form'd; but they were at laſt follow'd by a brother yet a *fœtus*, that was conceiv'd in an adjunct *Uterus*, in a place ſo little capable of diſtenſion, that ſeeking enlargement, after it had cauſed to the Mother for two months and an half grievous ſymptoms, did at laſt, being of the age of about 3. or 4. months, break priſon, and found its grave in that of its mother, by a very great effuſion of blood in the whole capacity of her *abdomen*; which caſt the mother into ſuch violent convulſive motions for 3. days together, that ſhe dyed of them. VVhereupon the ſaid *Vaſſal*, after, having embalmed the parts, he had made at his houſe for a whole month together the particular diſſection thereof, before all the moſt Curious and knowing Phyſitians, Chirurgeons, Apothecaries, Mid-wifes, and other Searchers of Nature, that are in *Paris*, thought good to preſerve the Hiſtory thereof by committing it and the Figure of the parts ſpoken of, to the Preſs, together with a Table, for better explanation; which we think fit here to annex in *Latin*:

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[*] *It may be, that that, which is by M.* Vaſſal, *Publiſher of this Relation, eſteem'd a* ſecond *Womb, is nothing elſe, but the true* Matrix *lengthen'd, or that, which by Anatomiſts is call'd* Tuba Fallopii. *See.* Bartol. *Anatom. Reform. l.* 1. *c.* 27. *and others.*

A	*Pars vaginæ.*
B.	*Orificium internumMatricis apertæ.*
C.	*Collum Matricis.*
D.	*Cavitas Matricis.*
E.	*Linea ſeparans cavitatem Matricis.*
F.	*Uteri fundus.*
G.	*Duo ſinus, inventi in fundo Uteri.*
H.	H. *Craſſities Uteri.*
I.	I. *Ligamentum latum, ſive productio Peritonæi lateris ſiniſtri, continens in plicatura ſua Vaſa deferentia et ejaculantia.*
K.	*Arteria Spermatica.*
L.	*Vena Spermatica.*
M.	*Teſticulus.*
N.	*Verum vas Ejaculatorium inſertum fundo* Vteri *per ſinum ibi inventum.*
O.	*Alterum vas Ejaculans, quod ingreditur Collum Uteri, quò ejaculantur mulieres à conceptu.*
P	*Tuba Vteri.*
R.	*Ligamentum rotundum.*
S.	*Ligamentum latum ab ea parte, ubi* Spurius hic Vterus *formatus eſt.*
U.	*Vena Spermatica.*
T.	*Arteria Spermatica.*
Y.	*Teſticulus.*
Z.	*Pars Tubæ.*
2.	*Verum vas jaculatorium, quod fundum Vteri ingreditur per ſinum ſupra dictum.*
3	*Alterum Iaculatorium, abiens in Vteri collum.*
4.	*Pars lacerata à fœtu aucto.*
5.	*Fœtus eo ſitu, quo inventus fuit Amnio ſuo obvolutus.*
6.	*Vaſa Umbilicalia.*
7.	*Placenta, ſubſtantiæ cuidam carnoſæ adhærens.*
8.	*Subſtantia carnoſa.*
9.	*Ligamentum rotundum.*

An Accompt
Of ſome Books.

I. THOMÆ HOBBES *Quadratura Circuli, Cubatio Sphæræ, Duplicatio Cubi, confutata, Auth.* JOHANNE WALLIS S. T. D. *Geometriæ Profeſſore Saviliano,* Oxon. 1669. *in* 4o.

WHen the Publiſher intended to give notice to the World of Mr. *Hobbſ's* Book very lately come abroad, concerning the *Quadrature of the Circle &c.* he ſoon found another, containing both that and the Confutation of it together.

The Author of this Confutation obſerveth two grand miſtakes in Mr. *Hobbs's* Tract; the *firſt* in the Demonſtration of his firſt Propoſition, where theſe words, *Aut ergo in Triangulo A C G, triangulum rectangulum, cujus vertex ſit A, æquale Sectori A C L ſumi nullum poteſt; aut P Q L, C Y P, ſunt æqualia,* are upon our Authors Examination not at all prov'd, nor true. It ſeems, M. *Hobbs* had only prov'd, That *If P Q L, C Y P, be equal, Then ſuch a Triangle may be*; but not the Converſe, *If thoſe be not equall, then ſuch a Triangle cannot be.* For, if P Q L be not equall, but a little bigger than C Y P; and conſequently, the Right-angled Triangle A Y Q ſo much bigger than the Sector A C L; it is manifeſt, that a Line drawn parallel to the Baſe Q Y, a little nearer to the *Vertex* A, may cut off a like Right-angled Triangle (a little leſs then A Y Q) which may be equall to the Sector A C L.

Beſides this (which overthrows all, in the examiners Iudgement) the other great miſtake of M. *Hobbs* is alledged to be in the Demonſtration of the *ſecond* Propoſition; where (ſuppoſing by the firſt Propoſition a ſquare found equall to a Circle) he argues, That, becauſe the Square takes in as much of what is left out by the Circle, as the Circle takes in of what is left out by the Square; therefore a Cube anſwering to that Square, compar'd with a Sphere anſwering to that Circle, will doe ſo too: (which would have been well argued, *ſaith the Examiner,* of a Cylinder on that Circle, of equall height with a Cube on that Square; but not ſo of a Sphere.) So that he ſeems here to have miſtaken a *Cylinder* for a *Sphere.*

Beſides theſe two (which doe influence all that follows) Mr *Hobbes* alſo, in his 2d *Figure*, ſuppoſeth (untruly, ſaith Dr *Wallis*) without proof, That (on the common Center A) the Arches drawn by Y. O. h, will cutt the Line A G in the ſame points b, c, l, where the ſtreight Lines e b, z c, k l, (parallel to C G) doe cut the ſaid Line A G: (which do influence all thoſe Propoſitions, which depend on theſe Suppoſitions.) Other particular miſtakes obſerved by our Author are here omitted.

N. On this occaſion the Reader is made acqainted, that all the works of Dr Wallis, which of late have been ſcarce, are now to be had at the Shop of Moſes Pitt *Bookſeller at the White Heart in* Little Brittaine.

II. HISTORIA GERAL DE ETHIOPIA A ALTA, Em Conimbra A. 1660. in fol.

This Hiſtory written in the Portugueſe Language, as tis now moulded, by Padre *Balthezar Tellez*, Provincial of the Ieſuits of Portugall, out of that of Padre *Manoel d' Almeyda*, was not ſeen, I think, here in England before now, an Exemplar of it having been lately tranſmitted and preſented to the *R. Society* from *Liſbon* by Padre *Hieronymo Lobo* (one of the ſame order) by the care of Sir *Robert Southwell* Knight, his Majeſties Envoy Extraordinary to that Court.

Paſſing by the accompt and relations, given in this Book, concerning the kingdoms and Provinces, comprehended under the *Abyſſin* Empire, and its cuſtoms, Government, Militia, Citties, Revenues, Emperors, Religion, Diſcoveries and pretended Converſions there made by the Portugueſe, together with the Contradictions and Diſappointments, which thoſe of Religious Orders have met with in that Empire; We ſhall only take notice here of the Heads it contains of a Philoſophicall nature: Concerning which there is to be found a good deſcription of the true Head and Courſe of the River *Nile* together with a plaine Mapp thereof; as alſo of the Lake *Dembea*, through which the ſaid River paſſeth, and of all the Cataracts of it; and then of the Climate, and Temperature, Mountains, Fertility, Herbs, Trees, Animals Wild and Tame, and the inclinations of the inhabitants; beſides, of the Read Sea, and the reaſon of its Appellation: Touching which particulars we muſt not here enlarge, but remit the Reader to the Book it ſelf; or (ſince Copies of it are difficult to be had) to the Relations lately Engliſh'd by Sir *Peter Wych*, and printed for Mr *Iohn Martyn*; wherein the maine paſſages, which concerne the Natural productions and other Curious Obſervables of that vaſt Country, are deſcribed.

III. An HISTORICAL ESSAY Endeavouring a Probability, That the LANGUAGE of CHINA is the *Primitive Language*; by *Iohn Webb* Eſquire. Printed for *Nath. Brook* in London, 1669. in 8o.

This ſurpriſing Eſſay attempts to make it out from Authorities, Judged by the Writer thereof unqueſtionable, *That* the *Chineſe* have been a people, ever ſince the Flood of *Noah* and before the Confuſion of Tongues (at which they were not preſent in his opinion;) *That* their Language hath continually in all times, from their firſt beginning of being a Nation, been preſerv'd in written Books; *That* the Characters, wherein thoſe Books be written, are the ſelf ſame, which from all Antiquity were extracted from their Original Hieroglyphicks; *That* in thoſe Characters their Language hath ever ſince conſiſted, and, according to them, is at this preſent day ſpoken purely; and *that* by the ſame Characters their Language is generally underſtood through the whole *Chineſe* world: From all which, conſidered together, the Author concludes, that the *Mother* or *Natural-Language* of *China* remaines in its Antient purity without any alteration.

How credible the Allegations here deliver'd, and how cogent the Diſcourſes and Inferences, grounded thereon, are, we muſt leave to the Iudgement of the ſagacious Reader; and ſhall only further take notice of the ſingular diligence of this Author in collecting occaſionally and abbreviating many of the moſt remarkable Obſervations of *China* recorded by the beſt Writers of that Empire. E. g. *That* the *Chineſe* have had the Uſe of Letters longer by farr, than any other people; *that* the remote parts *of Aſia* were planted before the diſperſion of Babel; *that* China was the firſt planted Contry after the Flood; *that* thoſe Plantations were undertaken and ſetled before the remove to *Shinaar* (the plaine where Babel was a building;) *that* the Chineſe have diffus'd themſelves to *Corea*, *Iapan*, *Iava*, *Ceylon*, *Siam*, *Cambori*, and *Madagaſcar*, if not *Mexico*, itſelf; *that* the China-wall hath laſted near 2000 years, and yet is not injured by time; *that* the *Tartars* are become *Chineſe*, not theſe Tartars, to the preſervation of the Mother-tongue of China; *that* the *Chineſe* have ſubſiſted 4000 years without any commixture with other Nations; *that* Commerce and Conqueſt have had no influence to change the Laws, Cuſtoms, or Language of that people; *that* the Hiſtoricall Computation of the Chineſe begins from 2207. years before Chriſt, which falls out with the 40th year before the Confuſion of Tongues; *that* no Nation in the world is comparable to them for certainty in Chronology, *&c.*

And as to their Ingenuities and Arts, he notes, *That* the Loadſtone and Compaſs hath been in uſe among them above 1100 years, and Paper-and Ink-making, above 180. years, both before Chriſt; *that* they prepare Ink of the ſmoak of oyle; *that* they have been long acquainted with the Invention of Gunpowder, and Fireworks, as alſo with the Manufacture of making and dying of Silk, invented by one of their Empreſſes; that their Potters myſtery and the manner of making Porcelain veſſels excels all other practiſes of that kind; and that they themſelves do ſo much eſteem it, as that they will not be ſerved in Plate; that the Earth for making *Porcelaine* is to be had in the ſole Province of *Nanking*, but that *there* they cannot make any Veſſels of it, (whether it be from the quality of the water or wood, or temper of the fire, is not known;) but muſt tranſport it to *Sincleſimo* in the Province of *Kiangſi*; that that Earth is very leane, fine, and ſhining like Sand, which they temper in water to reduce into the faſhion of little ſquare lumps; that they prepare and faſhion it almoſt after the ſame manner as the *Italians* do make their *Faenza*-diſhes, or as the *Hollanders*, in making their White Potters-work; that they make uſe of *Indigo* or *Woad* in painting their work with blew; but that for all this knowledge there remaines ſtill ſomething, neceſſary to make theſe veſſels aright, which they keep very ſecret, inſomuch that he paſſeth amongſt them for one of the greateſt Criminals, that reveals this Art to any but his own Children.

Laſtly, as to their Art of *Printing*, which was invented among them about 50. years after Chriſt, their manner is, That they cut their Letters with an inſtrument of Iron, (as we doe Wood-prints) upon ſome fit wood; lightly gluing the Written Copy thereon, whereby their Books are free from *Errata's*. They are very dextrous at it, and will cut a whole ſheet, as ſoon as a Compoſer with us can ſet one; and one man will print off 1500. in a day. They have alſo this conveniency, that their Forms may be laid by for as many impreſſions as they pleaſe, and in the mean time print off no more copies, than they find ſale for, *&c.*

IV. An EXAMEN of the way of TEACHING THE LATIN TONGUE by Vſe alone. Engliſhed out of French, and printed for Mr *Martyn* in London, 1669. in 12°.

As *Montagne* learnt the *Latin* tongue by Vſe alone, his Father having plac'd him in his Child-hood with ſuch perſons as ſpake nothing but that Language with him; ſo does the Author of this Book undertake to ſhew, that without much difficulty the like may be done with others, confirming what he ſaith, firſt, by an Example of a Boy, who having been bred, as ſoon as he was wean'd, (which was at the 22th month of his Age) like *Montagne*, ſpeaks *Latin* frankly and properly, being hardly *four* years old, and hath been ſeen by the King and all the Court at *Paris*: ſecondly by two other Children, both very young, that are entred into the ſame conduct; and in a very hopeful way of ſucceſs. To which the Author ſubjoyns a Diſcourſe of the great Vſefulneſs of this Method, the maine advantage of it being, that Children may employ in Learning Arts and Sciences, all that time, which they ſpend in acquiring the *Latin* Tongue.

Advertiſements,

1. T*He Reader is deſired, to inſert in* Numb. 47. *p.* 951. *ſect.* 10. *after theſe words,* Why it goes too faſt, *this Note* (as it may happen, when by ſome accident the *Cheeks* retaine not their proper figures,) *And now if it ſhould be ſaid, that upon any foulneſs the Watch will goe faſter by reaſon of the ſhorter Vibrations of the Pendulum, it is to be conſidered, That this is only true when the Watches have* no Cheeks, *but when they haue them (as in thoſe hitherto uſed) 'tis not ſo.*

2. *If it ſhould be demanded, Why in the ſame* Tract *uſe hath not been made of* Tycho's *Æquation of Time, nor of that of* Bullialdus, *but one is given different from both? The Anſwer is, That the* Table, *there publiſht, is the Difference of the* Right Aſcenſion *of the Sun at Noon from the* Mean motion, *accounting from th 1ſt of* February; *which muſt be the* true *Æquation; unleſs the Velocity of the Earth*'s *Motion about her own* Axis *be not conſtantly the ſame.*

Errat.

Numb. 47. *p.* 945: *in the 2d columne blot out* diff. *before 6. 5. 1. and put it before the 3d rank of numbers above it, viz. before* 11. 49. 56.

L O N D O N,

Printed by *T. N.* for *John Martyn* Printer to the *Royal Society*, and
are to be ſold at the *Bell* a little without *Temple-Bar*, 1669.

Tranſact: Nº 48

Fig. II.

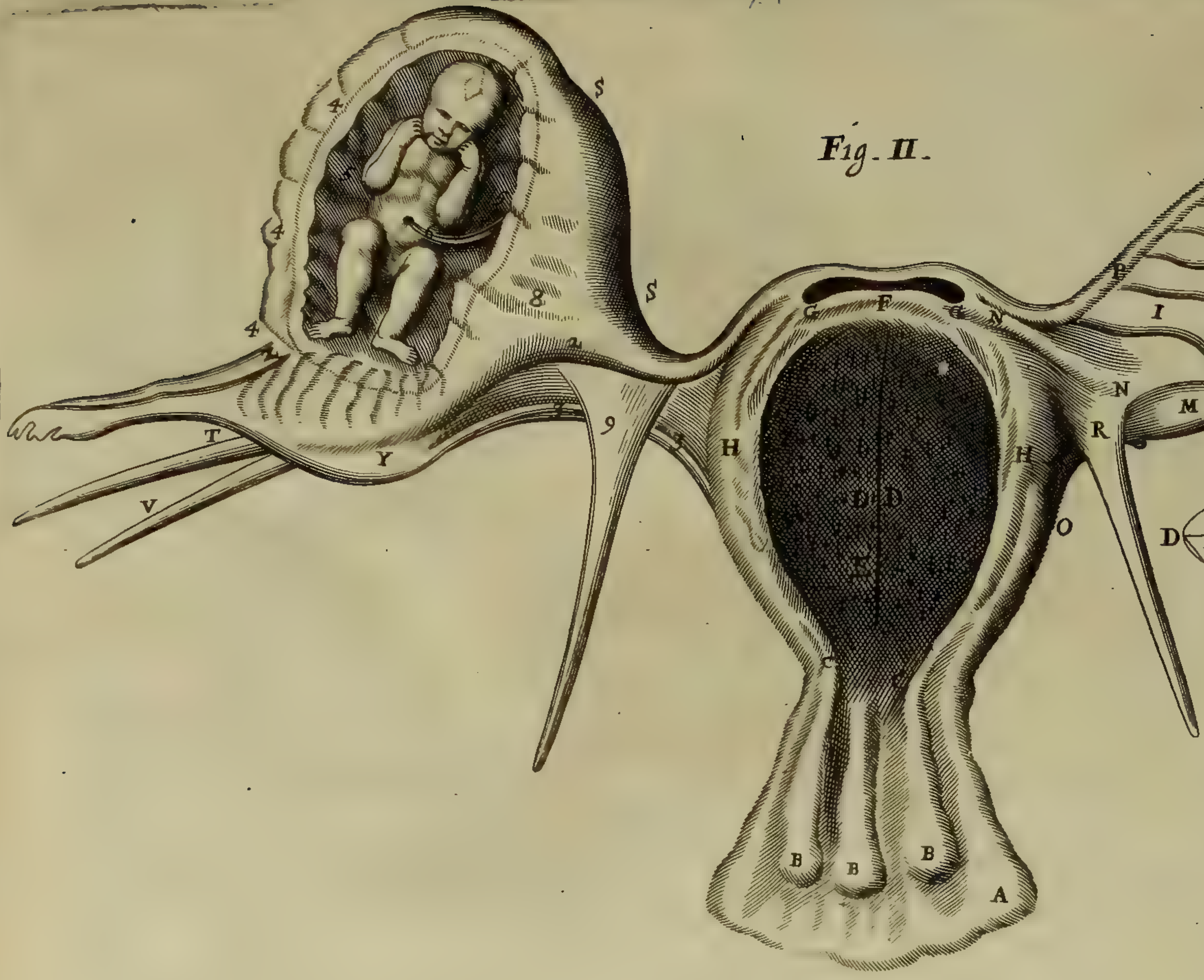
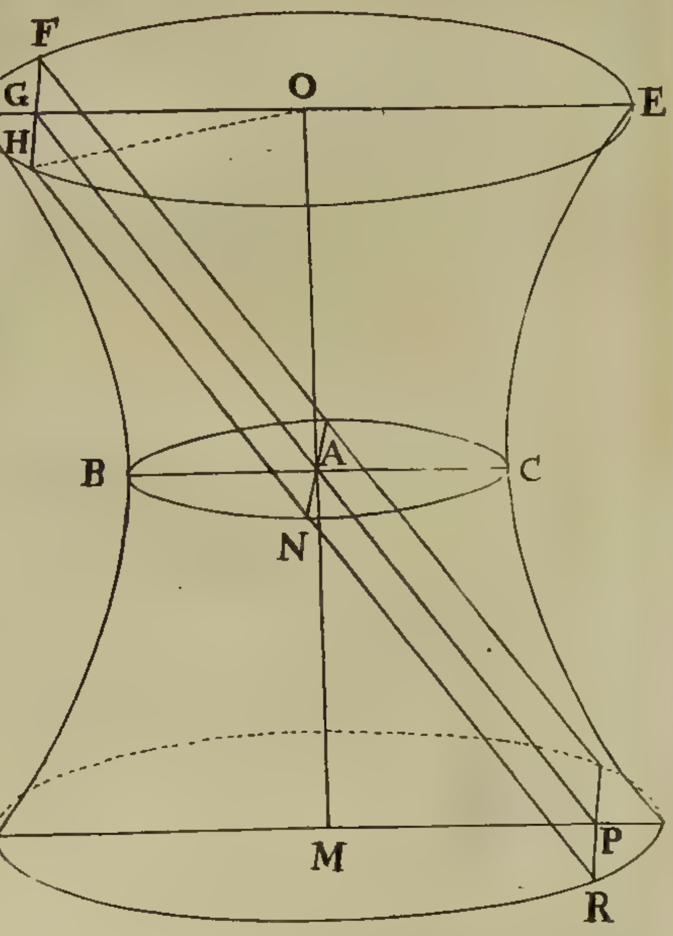


Fig. I.



BRITISH MUSEUM NATURAL HISTORY.

Numb. 49

PHILOSOPHICAL TRANSACTIONS.

July 19. 1669.

The Contents.

Obſervations concerning the Bath-Springs. *An Extract of a Letter, about the Icy and Chryſtallin Mountains of* Helvetia. *Some Obſervations concerning* Japan, *its Scituation, Temperature, Productions, Cuſtoms &c An Accompt from* Paris *concerning a great Metallin* Burning Concave*: and ſome of the moſt conſiderable Effects of it. An Accompt of four Books I. MARC. MALPIGHII Diſſertatio Epiſtolica De BOMBYCE,* Regiæ Societati Anglicanæ *dicata. II. DESCRIPTION ANATOMIQUE d'un CAMELEON, d'un CASTOR, d'un DROMEDAIRE, d'un OURS, et d'une GAZELLE. III. LABYRINTHUS ALGEBRÆ, Auth. JOH. JAC. FERGUSON. IV. An ANSWER to HYDROLOGIA CHYMICA of* William Simpſon *by ROBERT WITTIE D. M.*

Obſervations

Concerning the Bath-Springs, *communicated by Mr.* Joſeph Glanvill, *in a Letter to the Publiſher dated* June 16. 1669: *at the* Bath.

Sir, I Have now made the moſt carefull Inquiry, I can, concerning our *Baths*; and have theſe particulars to return to you in anſwer to your *Queries*.

1. The Country round this Citty is very hilly and uneven;

but the Hills lye in no order; they are generally rocky and ſteepe from South-weſt and by Weſt, to North and by North: th, whole Tract of the Country, within 5. and 7. miles, abounds with Coal-mines, more or leſs. But there are no other conſiderable Mines, that I can hear of, nearer then *Mendip*, which is 10. miles hence, excepting ſome of Lead at *Berry* in *Gloceſter-ſhire*, which lyes up on the North of this place, about 4. or 5. miles diſtant.

2. The Hills for the moſt part afford a Free ſtone; and on the North-weſt of *Lanſdown* (which hath that ſituation to the Town, and is juſt above it) the Stones, digg'd there, are a ſort of hard ſtone, commonly call'd a *Lyas*, blue and white, poliſhable.

3. The Town and Baths are of very great Antiquity. Beſides what I find in very ancient Chronicles to that purpoſe, one of our great Antiquaries (Mr. P.) aſſerts, that theſe Baths were 800. years before Chriſt. Which if ſo, would give occaſion to inquire, how conſiſtent with it that *Hypotheſis*, concerning the Cauſe of the Heat of theſe Waters, would be, which makes it to be the Fermentation of Minerals in *fieri*; and, whether it be likely, that the Minerals, through which theſe waters paſs, ſhould be in that ſtate of imperfection ſo many hundred years, and that the whole diſpos'd matter in thoſe places ſhould not be perfectly concreted in ſo great a Tract of time. You doubtleſs know the other conjecture, which ſuppoſeth the cauſe of this heat to be, That two ſtreames having run through and imbibed certain ſorts of different Minerals, meet at laſt, after they have been deeply impregnated, and mingle their liquors, from which commixture ariſes a great fermentation, that cauſes heat; like as we ſee it is in *Vitriol* aud *Tartar*, which though ſeparately they are not hot, yet when mingled beget an intenſe heat and ebullition between them. This ſeems to me a probable cauſe of the laſtingneſs of the heat of theſe waters. But it is not my buſineſs to offer *Hypotheſes*; therefore craving pardon for this digreſſion, I proceed in my Account.

4 It is affirm'd here, that the Town for the moſt part is built upon a Quag-mire, though the places all about it are very firm ground. Some workmen, that have been employ'd in digging,

have found a mire ten foot deep: without the North-gate, the higeſt place of the Town, at ſeaven. The Earth between is a kind of rubbiſh; ſometimes they find pitching a mans length vnder ground, and paſſages for the water to paſs: 7. or 8. foot down they have met with *Oyſter-ſhells.*

5. The Town and Country circumjacent, generally abound with cold Springs: and in ſome places the hot and cold ariſe very near each other; in one place, within two yards, and in others, within 8. or 9. of the main Bathes.

☞ 6. The Guides of the *Croſs-Bath* informe me, that, when there is a great Weſt-wind abroad, ſtanding by the Springs they feel a cold air ariſing from beneath: if the Wind be at Eaſt, and the morning cloſe with a little miſling rain, the *Croſſ-Bath* is ſo hot as ſcarce to be endur'd, when the *Kings*-and *Hot-Baths* are colder than uſual. In other winds let the weather be how it will, this Bath is temperate. The Springs that buble moſt are coldeſt. The *Croſ-Bath* fills in 16. hours, both in Winter and Summer, without any difference from heat or cold, flouds or drought. That of the *Kings*, in 12. or 14.

7. A man may better (ordinarily) endure 4. hours bathing in the *Croſs-bath*, than 1½ in the others. In the *Queens* Bath (which hath no Springs of its own; but comes all out of the *Kings*) they have found under a flat ſtone, which upon occaſion was taken up, a Tunnel, and a yeelding mudd in and under it, into which they thruſt a pike, but could feel no bottom. In the *Kings-bath* there is a Spring ſo hot, that it is ſcarce ſufferable, ſo that they are fain to turn much of it away, for fear of inflaming the Bath. The hotteſt Spring will not harden an Egge.

8. The Bath-water does not paſs through the body like other Minerall waters; but if you put in Salt, it purgeth preſently. Upon ſetlement it affords a black mudd, uſefull in aſches, applyed by way of *Cataplaſme*; to ſome more ſucceſſull then the very waters. The like it depoſits upon Diſtillation, and no other. Nor hath any more been diſcover'd upon all the Chymical examinations, that have come to our knowledge. One Dr *Aſtendoff* found, that the colour of the Salt, drawn from the *Kings*-and *Hot-bath*, was yellow; that, which was

extracted from the *Croſs-bath*, white. This Doctor concluded, that the *Croſs-bath* had more of *Allum* and *Niter*, than the hotter Bathes, which abound more with *Sulphur*. And yet *that* Bath looſens ſhrunk ſinews, by which it ſhould ſeem it abounds not much with *Allum*. It is harſher to the taſte then the other Baths, and ſoaks the hands more.

9. A man cannot drink half the quantity of ſtrong drinks in the Bath, that he can out of it; but if he hath drank before to exceſs, it allay's much, and is a great refreſhment to the body. The Bath provoketh Urine.

10. They are very uſefull in diſeaſes of the Head; Palſies, Epilepſies and Convulſions: In Cuticular diſeaſes, Leproſies, Jtches and Scabbs: In all Obſtructions of the Bowels, as Spleen, Liver, and Meſentery; and the ſcirroſity and hardneſs of thoſe parts: In moſt diſeaſes of Women; In the Scurvey and Stone: as to which laſt, while I am writing, an Alderman of the Citty aſſures me, that his Wife, who had been exceedingly troubled with the Stone, went into the *Croſs-bath* for it, and voided there ſeveral ſtones as bigg as thoſe of Olives, and was never troubled with that diſtemper after. The Bath is alſo good in *cold* Gouts, as they call them. The ſame Alderman tells me, that it gives him preſent eaſe, when he is troubled with the fits of it. He uſes to goe in, aſſoon as the fit takes him, which then goes off preſently, and returns not in a conſiderable time after: He puts his feet upon the hotteſt ſprings in the *Kings-Bath*. But it hath a contrary effect in *hott* Gouts; and ſome, who are troubled with that diſtemper, tell me, that the Bath puts them into a fit, if they goe into it without preparation; or, if they have the fit before, it inflames it more, and ſends it about the body, and diſables the Joynt ſo, that there is no treading on it for the preſent. Further, the Bath is effectuall in the diſeaſes of Children, particularly the *Rickets*, removing the humors, that proceed from it, without faile. 'Tis alſo good for Women, that are apt to miſcarry, if us'd moderately. The Bath-guides goe in, when they are ready to lye down; and other woemen of the Town uſe it ordinarily throughout their time, and are never obſerved to miſcarry. It facilitates deliverance. Beſides, it is very effectuall for the ſtrengthning of broken Bones, and

good in all cold and moiſt diſtempers and weakneſs of Nerves, Stupefactions, Relaxations, and violent Pains: in all which it gives eaſe, except the *Lues Venerea*; for in that (except the malignity be overcome by the methods of Phyſick) it exaſperates the pain more. 'Tis an excellent remedy to remove the remaining weakneſs in Gouts, as hath been remarkably exemplified in old men, even to the age of 83. years.

11. There is no inſtance of Cures perform'd by it in former times, but we have experience of the ſame in ours; yea and in ſome others, as in Dropſies, Cachexies, Spleen *&c.* In which caſes they were ſhy heretofore of uſing the Bath, for fear of confirming thoſe Obſtructions, whereas 'tis now found, that their Cure is facilitated by it.

12. The Bath-guides live to a very great age, ſometimes to near 100. years; ordinarily, if they are temperate, to 70. There are two at this time above 80, a man and his wife.

13. In the *Croſs bath* the Guides have obſerved a certain black Fly with ſealed wings, in the form of a *Lady-cow*, but ſomewhat bigger. They ſay, it ſhoots quick in the water, and ſometimes bites. It lives under the water, and is never found but in very hot weather: They ſuppoſe, it comes up with the Springs. It is not to be ſeen elſewhere. I had one of thoſe Inſects ſent me laſt year, which I preſerv'd till I came to *London*, intending to have given it you; but I know not, how I loſt it there.

14. The *Croſs-bath* eats out ſilver exceedingly; and I am told, that a ſhilling in a weeks time hath been ſo eaten by it, that it might be wound about one's finger. The Baths agree (as the vulgar ſpeaks) with Braſs, but not with Iron: for, they will eat out a ring of *this* metall in 7. years, when Braſs-rings ſeem to receive no prejudice at all from it.

15. When Women have waſht their hair with the mixture of beaten eggs and oatmeal, this will poiſon the Bath ſo, as to beget a moſt noiſome ſmell, caſting a ſea-green on the water, which otherwiſe is very pure aud limpid. This will taint the very walls, and there is no cleanſing of it, but by drawing the Bath.

16. In Summer the Baths purge up a green ſcum on the top, but in Winter never; but then leave a yellow on the Walls.

17. The Walls that keep in the hot ſprings are very deep-ſet, and large; 10. foot thick, and 14. deep from the level of the ſtreet. The cement of the wall is tallow, clay, lime and beaten bricks. In the year 1659. the *Hot-bath* (a Bath particularly ſo call'd, of equall heat with the *Kings-bath*) was much impaired by the breaking out of a Spring, which the workmen at laſt found again, and reſtored. In digging they came to a firm foundation of factitious matter, which had holes in it like a Pumice-ſtone, through which the water played; ſo that 'tis like the Springs are brought together by Art: which probably was the Necromancy, the people of antient times believed and reported to have contrived and made theſe Baths; as in a very antient manuſcript Chronicle I find theſe words: *When* Lud Hidibras *was dead*, Bladud *his Son, a great Nygromancer* (ſo 'tis there writ) *was made King, and he made the wonder of the hot Bath by his Nygromancy; and he reigned* 21. *years, and after he died, and lyes at the new Troy.* And in another old Chronicle 'tis ſaid, *That King* Bladud *ſent for Necromancers to* Athens *to effect this great buſineſs*; who 'tis like were no other then cunning Artificers, well ſkill'd in Architecture and Mechanicks.

18. It hath been obſerv'd, that leaves, like thoſe of Olives, come ſometimes out of the Pump of the *Hot-Bath*.

Theſe, Sir, are all the Obſervations I have been able to collect yet: if any thing elſe material ſhall hereafter come to my knowledg about theſe matters, I ſhall not fail to impart them, God permitting. Perhaps theſe things may adminiſter occaſion to more Queſtions relating to the Bath, and their *Phænomena*. If you or any other ingenious perſon of the R. *Society* ſhall propoſe any to me, I ſhall take what care I can to have them punctually anſwer'd. I am *&c.*

Extract of a Letter,

Written by Mr. Muraltus *of* Zurich, *to M.* Haak, *a Fellow of the R. Society, concerning the Icy and Chryſtallin Mountains of* Helvetia, *call'd the Gletſcher. Engliſh'd out of Latin by the Publiſher, as follows;*

THe higeſt Jcy Mountains of *Helvetia* about *Valeſia* and *Auguſta*, in the Canton of *Bern*; about *Taminium* and *Tavetſch* of the *Rhætians*, are alwayes ſeen cover'd with

Snow. The Snow, melted by the heat of the Summer, other Snow being faln within a little while after, is hardned into Jce, which by little and little in a long tract of time depurating it ſelf turns into a Stone, not yeilding in hardneſs and clearneſs to Chryſtall. Such Stones cloſely Joyned and compacted together compoſe a whole Mountain, and that a very firm one; though in Summer-time the Country-people have obſerved it to burſt aſunder with great cracking, Thunder-like: which is alſo well known to Hunters to their great coſt, foraſmuch as ſuch cracks and openings, being by the Winds covered with Snow, are the death of thoſe, that paſs over them.

At the foot of theſe mountains are with great labour digg'd out Chryſtals, which are found among other foſſils, of two ſorts and colors; ſome of them are darkiſh and troubled, which by ſome are call'd the Chryſtal-ore, to be plenteouſly found in the aſcent of Mount *Gotthard*; others tranſparent, very pure and as clear as Venice-glaſs; ſexangular, great and ſmall: as in the mountains about *Valeſia*, and the Town call'd *Urſelen* at the foot of the Hill *Schelenin* they are digg'd out, and ſold at a good rate. Of this latter kind my Parents, four years agoe, tranſmitted a very bigg and fair one to *Milan* for 80. pound ſterling.

This is, what I have obſerved about theſe Hills; What I ſhall farther learn of the people, inhabiting thereabout, to whom I have written a month ſince, I ſhall impart to you.

In *September* 1668.

Some Obſervations

Concerning Iapan, *made by an Ingenious perſon, that hath many years reſided in that Country; as they were communicated in* French *by M. I; whence they are thus Engliſh'd by the Publiſher; who ſome months agoe accaſion'd this Accompt by ſome* Queries, *ſent to that Traveller.*

1. THe *Japoneſe* doubt not at all of their Contry's being an *Iſland*; though it be ſeparated from the Continent by ſuch narrow Channels that no veſſell of any conſiderable burthen can paſs them.

2. The Air is there very ſalubrious, but of another temper on this, than on that ſide of the Mountains, which divide *Japan.* The Plague hath never been heard of there; but the ſmall Pox and Fluxes are very frequent.

3. Their Mountains are fertil almoſt to the very top.

4. There are found almoſt all *European* ſorts of Fruit, Peaches, Apricoks, Cherries, Prunes, Apples, Pears, and particularly Pipins, Bon Chretien-Pears; Beſides theſe, there is an infinity of other Fruit; but almoſt none, but what is alſo found in ſome part or other of *India.*

5. Silver is there in its higheſt perfection, but not uſed in Trade; in which is ſeen nothing but Gold, and ſome ſmall coyn of Braſs; which latter they ſpoile by refining it too much. Steell alſo is there very good.

6. The temper of their Metals was formerly better than 'tis now; but yet they make Courtelas's or ſhort Swords exceeding good.

7. The great Mountain of *Japan* is higher than the *Pico* in *Teneriff*, ſince being above 18. leagues diſtant from the Sea-ſide, it may be ſeen above 40. leagues off at Sea. There are 8. *Vulcans* or Fire-ſpitting mountains in *Japan*; and you cannot goe into the Campagne, but you diſcover one or other of them.

8. There are many Medicinal waters, and Hott Springs there, which the Inhabitants uſe in their diſtempers. They have particular Medicines; but they let no Blood. They make much uſe of Cauſticks, by applying upon ſome nerve or other the powder of *Artemiſia* or *Mugwort*, and Cotton, which they ſet on fire. They always drink their liquors warme.

9. There is ſo great a ſtore of Venaiſon in *Japan*, that they care little for Cattle, though there be no want of them. They employ moſt Oxen for Ploughing; and they make no Butter nor Cheeſe, nor are they lovers of Milk. They have great plenty of Corn and Rice.

10. The *Japoneſe* are proper enough of ſtature, and not uncomely in features; they have ſomewhat prominent bellys. They are exceeding active, and want no Judgement; they are alſo military and valiant.

11. No Arts are to be met with amongſts them, that are

not known in *Europe*; except that of making *Lacca*, of which there is ſome ſo fine and curious, that whereas in this Country one may buy an ordinary ſmall boxe for 3. or 4. Crowns, one of the ſame ſize, when made in Japan of exquiſite Lacca, will ſell for more than 80. crowns. The Author of this Accompt hath 4. Cabinets of this workmanſhip, which he affirmes to have coſt him above 40000 crowns, which he will not ſell under 80000. crowns.

12. The Colours, with which they dye their ſtuffs, never fade. I have ſeen one of them, which our *Vermillon* and *Couleur de feu* come not near to. It is extracted out of a Flower, like to Saffron, and one pound of it coſts an incredible price. To try, whether the Colour will not change by *Lixivium* or Lye, they apply an hot Iron to it; and if there it holds, they aſſure themſelves of the durableneſs of the Colour.

13. They have Mathematicians amongſt them, and believe Judiciary Aſtrology, inſomuch that the Grandees undertake nothing without pre-conſulting thoſe, that make profeſſion of the ſame.

14. *Japan* yeilds divers ſorts of good merchantable Commodities; but chiefly all ſorts of ſilken Stuffs, unwrought Silk, Amber, Precious Stones, Musk, Copper, Steel, Lack-work.

15. The Country is very well peopled and exceeding rich, being exceedingly ſtored with Gold-mines; and I have ſeen ſome of the Gold-ore, which of 10. ounces yeilded 8. of the higheſt fineneſs, and pieces of the weight of 120. marks.

16. Their Buildings are very good and commodious. The Appartments are all below on the ground, ſeparated from one another by partitions of Carton painted and guilt, which may be foulded and removed like Skreens. Their floors are covered with mattes, and ſomtimes with ſilken ſtuff, embroidered velvet, and cloth of gold. All their buildings are but one ſtory high.

17. They have no other conveniences to defend themſelves from Heat and Cold, but ſuch as are uſual in Italy and Spaine.

18. They uſe the divertiſements of Comedies, which are more brave then thoſe of *Europe*. The Spectators are about 200. paces diſtant from the Theater, which being cover'd with a

vault

vault, makes the voice of the Actors to be underſtood to the very end of the Theater. They love Hunting, and Gaming, as Dice, Cards, Cheſs *&c.* At all times of the day, and in all their viſits they take Thea and Tobacco.

19. Their Language is altogether different from the *Chineſe*; but their Prieſts, and Courtiſans, that is, the Learn'd among them, which bear the Offices of the Court, underſtand the tongue of *Chochin-China*, and by this means that of *Tunquin, China, Corea &c.* They write neither from the right to the left, nor from the left to the right, but downeward.

20. Their Government is Deſpotique; the Religion Pagan; the Chriſtian hated upon no other accompt, but that ſome of thoſe, that there profeſſed it, would perſwade the *Japoneſe* to acknowledg a Superiority above the dignity Royall, diſpoſing of Crowns and Scepters. Their Morals are very good, their *faults* being puniſh't as their *Crimes*, even Lying and Detraction. Their left hand is the more honourable, and they take horſe on that ſide.

An Account from Paris *Concerning a great Metallin* Burning Concave, *and ſome of the moſt conſiderable Effects of it: Communicated by ſeverall perſons upon the place, where Tryals have been made of it.*

It is true, that Monſieur de *Vilette* of *Lyons*, who formerly made that Burning Concave, * which was of about 30. inches diameter (diſpoſed of to the King of *Denmark*) hath made another, which is larger, now under tryal here. It is of 34. inches diameter, and melts all ſorts of Mettals, and Iron it ſelf of the thickneſs of a Silver-Crown, in leſs then a minute of time, and vitrifies Brick in the ſame time; and as for Wood, whether green or dry, it ſets it on fire in a moment. The King hath ſeen it and the performances of it with great ſatisfaction; and his Majeſty is likely to make it his, and and then to beſtow it on his Royal Academy of Philoſophers, for making of farther Experiments with it. *So far they.*

* *Deſcribed at large in* Numb. 6. *of theſe Tranſactions.*

Nota. *This kind of* Concaves, *burning moſt forcibly of any fire we know of, even beyond that of a Wind-furnace, would be of great uſe, if they could be ſo contrived as to have a* focus *of any conſiderable largeneſs, to take in a good quantity of combuſtible matter at once.*

An Accompt of ſome Books.

I. *MARC. MALPIGII, Phil. & Med. Bononienſis DISSERTATIO EPISTOLICA De BOMBYCE, Regiæ Societati dicata. Printed at* London *for* Iohn Martin *and* Iames Alleſtry *Printers to the R. Society, in* 4°.

THe Occaſion of this Curious and Laborious Diſcourſe will appeare from the Preface to it. The Book it ſelf gives an Acompt of the Production, Structure, Food, Growth, Sickneſſes, Workmanſhip, Changes, Generation, and Death of the *Silk-worm*; together with an accurate Anatomicall Deſcription of all, even the minuter parts of that Inſect, and the varieties of them in the ſeverall Changes, it undergoes; where yet the Author in ſuch particulars, which he finds himſelf ſhort off, or not well ſatisfied in, with great modeſty refers himſelf to the Aſſiſtance and farther conſideration of that *Society*, to whom he dedicateth this Epiſtle.

He begins with the Eggs and hatching of the Silk-worms, obſerves the Changes of their Colour: then proceeds to the growth of the Young worm; the various tryals in feeding it with divers other leaves but thoſe of Mulbery's; their ſickneſſes and the prognoſticks of them; the caſting of their skins, together with all the ſteps and the whole manner of the ſame.

In the Anatomicall Obſervations of the ſtructure of this Inſect, he takes notice, among many other things, of its *eleven* Rings or Inciſures, and of how many ſmall ones each of them is made up; giving their ſhape, different ſize, nature and compoſition. Then goes on to the Wrinkles of the Body, the Head, the Cranium, the Lip, Chin, Eyes, Teeth (cutting not by an up and down motion, but a laterall one) Hair, Leggs with their different ſhapes, articulations, claws, together with their poſture and motion for Spinning.

Of their *Internal* parts, he obſerves the quality of the humor, found in them, *viz.* concreting by the warmth of on's hand, and leaving a cruſt: next, the mucous and roſy-color'd skin, ſuppos'd to be the new skin, found under the exterior. Then he deſcribes the various Muſcles, and Fibres, both parallel, and oblique, more or leſs, together with the inſertion of the Fibres in every Ring, and of every Ring in the Cavity of its neighbouring Ring, for producing the Progreſſive Motion of the Animal; the manner of which is deſcribed very particularly.

He paſſes on to the Veſſels moiſtening all the parts, obſerving their branches and *anaſtomoſes*; their termination in one common trunck, and the curious net-work they make. Theſe veſſels prolonged, he makes to be the *Lungs*, whoſe ſtructure for Reſpiration he diligently deſcribes, illuſtrating the ſame with Obſervations made of other Inſects, and with ſome Trialls ſhewing, both that Air iſſues out of their body, and that Oily liquors will ſuffocate them, upon the Accompt only of ſtopping the orifice of their Wind-pipe. He inquires alſo, Whether the *Motion* of the *Abdomen* be neceſſary in theſe Inſects for Reſpiration, and ſeems to incline to the *Affirmative*.

From the Lungs he goes on to the *Heart*, which he ſaith reaches from the head to the taile, being of a ſtrange figure, and rather *many* hearts, than one; whoſe motion of *Syſtole* and *Diaſtole* he deſcribes, taking alſo notice, how the Vitall humor paſſes from one little heart to another.

The *Ventricle* he obſerves to reach alſo from one extreame of the Worm to the other; deſcribing its ſubſtance, ſhape, fibres, and veſſels bedewing it, together with its reſemblance to the Ventricle of other Inſects: where he particularly notes the great voracity of the Silk-worm, affirming, that it will eat as much in one day, as its whole empty body weighs.

In the ſides of the Belly about the Ventricle he finds a *Woof of Veſſels*, containing the *Silky Juyce*; deſcribing their progreſs from the mouth downeward into the belly, and their ſtrange flexures and meanders; whoſe *end* he affirmes to have at length, after a long and patient ſearch, found out. Of theſe Veſſels he makes a large and curious deſcription, as alſo of their different Juyces, as the cauſe of the different ſorts of Webbs and Baggs.

Neither is he wanting in giving an accurrate accompt of the fine texture of the *Spinall Marrow*, and the *Cranium*.

But from the Anatomy of the parts he proceeds to their *Feeding*, and obſerves the various ſpace of time for it.

He takes further notice, that though *Stench* be no prejudice to them, yet a *Southern* Wind and an extreme *Hot Air* make them ſick. He informes us alſo, how they are ordered after they have fed enough, and are ready to ſpin; as alſo, *how* they ſpin, what motions and poſtures they uſe in that work; how they apply their feet and claws; how they hold their head and other parts of the body; of what figure their Webb is; in what time the Bagg is finiſht, together with the difference of the Silk on one and the ſame bagg, and the conjunction ſometimes made by *two* worms in ſpinning *one* bagg, which he ſaith cauſeth ſuch an intanglement that the Silk cannot be wound off.

He forgets not to ſet down the *gradual Change* of the Silk-worm, after'tis exhauſted by ſpinning; how all the parts are altered, the teſticles enlarged, and the whole diſpoſed to aſſume the form of the *Aurelia* or *Chryſalis*, diveſting it ſelf of its coat in the ſpace of 1. min. 10. ſec; the manner of which he very curiouſly deſcribes, having attentively beheld it himſelf. He adds, how the Wings and other parts are form'd for the *Papilio* or *Butterfly*, and how indeed the Wings are latitant under the ſecond and third Ring of the Worm, before it works the bagg.

Of the *Aurelia* he deſcribes its ſhape and all the parts, and particularly the remaining *Veſtigia* of the ſilky Inteſtins, the Ventricle, and the concrete melleous Juyce therein, together with ſome though rare and ſcarce perceptible motion of the Heart. Then, how the *Aurelia* changes into a *Butterfly*, and in what time, *viz.* in the ſpace of 10. days in Summer, and in a Months time in Autumne and Winter. Where he adds, how the *Eggs* begin in the Femals upon their change into *Aurelia's*, and how at laſt the Butterfly breaks out by the meanes of its Claws and a ſharp liquor.

To this he ſubjoyns a particular deſcription of the form of the *Butterfly*, and all its parts; of the Motion of its Heart, of the differencing marks of the Male from the Female; of the curious ſtructure of the *Ovarium*; the parts of generation; the coit, and the ſtrange length of the time of it, the Male beating his wings about 130. times in one copulation; the multitude of Eggs amounting to 300. 400. ſometimes 500; and the death of the poor Fly, following 5. days after the coit in Summer, but not before the 12th day in Auguſt.

He omits not to inſtruct the reader of the ways of *keeping* the *Eggs*, and the manner of ordering them for Hatching: where he takes notice of one kind of Butterfly in *Sicily*, which is made *twice* fecund in *one* year, *viz.* in the end of Aprill, and the end of Auguſt.

He concludes with the way of *Winding off* the Baggs, and informes us, how many threds together will make good ſubſtantiall ſilk; where he affirmeth, that ſometimes he hath reckon'd 930. *Bononian* feet of ſilk, wound off from one bagg, without the exteriour *lanugo*, and the inmoſt laſt part, which both together might make a fourth part of that length more.

II. *DESCRIPTION ANATOMIQUE d'un CAMELEON, d'un CASTOR, d'un DROMEDAIRE, d'un OURS, et d'une GAZELLE. A* Paris 1669. *in* 4°.

THe Obſervations of theſe Animals diſſected were made in the Royall Library at *Paris* by ſome of the Ingenious Philoſophers there.

Of the *Cameleon* (which they ſay was an *Egyptian* one; they alledging, that there are two other ſorts, one of *Arabia*, and another of *Mexico*) they chiefly obſerve: *Firſt* that its contrary motions of Swelling and Un-ſwelling are not made as in other animals, dilating and preſently after contracting their breaſt for Reſpiration, in a conſtant and regular order; ſince they have ſeen it ſwell for the ſpace of above two hours, during which time it would indeed un-ſwell a little, but almoſt indiſcernibly, and alſo a little ſwell againe, but with that difference, that the dilatation was more ſuddain and more viſible, and that by long and unequall intervals; they having alſo obſerved it to ſubſide for a long time, and much longer than ſwell'd.

Secondly, that the grains in the Cameleons-Skin were diverſly poſited, and of a blewiſh-gray, when the animall was in the ſhade moveleſs, and had not been toucht a long while; but that the pawes underneath were white-yelowiſh, and the ſpace between the graines, of a pale and yellowiſh red: and that the ſaid gray, colouring him all over when at reſt, and remaining on the inſide of the skin, when flead, (which ſeem'd to argue, it was the naturall colour) did, when expoſed to the day-light, change in the Sun, ſo that all the places of its body, ſtruck by that light, took, inſtead of their blewiſh gray, a browner gray, approaching to a minim; but the reſt of the skin, not ſhone upon by the Sun, changed its gray into divers brighter colours, which formed Spots half an inch big, of an Iſabella-colour, by the mixture of the yellow pale in the graines, and the light brown in the ground of the skin: the other skin, not ſhone on by the Sun, and remaining of a gray paler then ordinary, being like cloath mixt of wool of divers colours, the ground continuing as before. The Sun ceaſing to ſhine, the firſt gray return'd by little and little, and being then toucht by one of the company, there appear'd preſently many very black ſpots on his ſhouldiers and forefeet, which hapn'd not, when he was handled by thoſe that took care of him. Being wrapp'd in white linnen for 2. or 3. minutes, he was taken out whitiſh, and having kept this colour a while, it vaniſht inſenſibly: which Experience refutes thoſe, who give out, that the Cameleon takes all colors but white. Having put him on divers things of ſeveral colours, and wrapt him up in them, he aſſumed none of their colors, but the white, neither took he this, but the firſt time of the trials.

Thirdly, the ſtructure and motion of his Eyes, turning two different ways at one and the ſame time; which yet is not true of the Cameleons of *Mexico*. Where 'tis obſerv'd, that the neceſſity, impos'd by nature on all other animals to move both their Eyes together the ſame way, is not cauſed by the conjunction of the Optick nerves, becauſe that alſo is found in the Cameleon it ſelf.

Fourthly, his way of taking hold of the ſmall branches of Trees, like that of a *Parret*, who puts two of his claws before and two behind, whereas other Birds alwayes put three before, and one behind.

Fifthly, his having no Spleen; a very little Heart, and exceeding little Brain, in which appeared no mark at all of any ſence for Hearing, this animall neither receiving nor giving any ſound.

Sixtly, his Tongue being furniſht with and faſtned to a long tromp, ſerving to lanch it out, for the taking of flyes, on which he feeds, and not on Air alone; the Obſervers having found many flyes in his ſtomach aud Guts; and taken notice alſo, that this Cameleon, they diſcourſe of, voided divers ſtones of the bigneſs of a pea, which he had not ſwallowed, but bred in his gutts, ſeeing one of them, being diſſolved in diſtilled vinegar, inclos'd the head of a fly.

By which Obſervations it appears, that though *Orators* have loſt thoſe pretty ſubjects to exerciſe their Eloquence upon, concerning the Wonders of the food, and of the Change of Colours in Cameleons; yet *Philoſophers* doe now meet with new particulars, touching the motion of his Eyes and Tongue, and the manner of altering his Colour according to his paſſions, which are no leſs capable to employ their Witt; as is at large and learnedly deduced by the Authors of theſe Obſervations.

In the *Caſtor* they note;

Firſt, his two ſorts of *Hair*, one ſhort, ſoft and fine, to defend him from cold; the other long and thick, to receive the mire, in which they often wallow, and to hinder it from getting to the skin.

Secondly, his Teeth, formed after a peculiar manner, exceeding fit to cut Trees, which they doe to build themſelves lodgings to breed their Young ones in; for which purpoſe Nature hath alſo furniſht them with ſuch fore-feet as exactly reſemble the hands of a man; the hind-feet, proper for ſwimming, being formed like thoſe of a Gooſe.

Thirdly, his Bladders containing the *Caſtoreum* (diſtinct from the Teſticles) of which they found four great ones about the lower part of the *Os pubis*; of which two were above the other two, but cloſely joyn'd to one another, the two upper being likely to prepare that matter, and the two other, to bring it to the perfection of more conſiſtence, and unctuouſneſs, as alſo of a ſtronger ſent and deeper yellow colour; for which purpoſe the two latter are of a glandular compoſition. But under this ſecond ſort of ſacks they found yet another long one, full of liquor, more yellow and liquid, and more elaborate, then that in the former; of a different ſmell, and like to the yolk of an egg; of which they write from *Canada*, that *Caſtors* uſe it to make themſelves an appetite, when they want it, and that they ſqueeſe it out by preſſing with their paws the bladder, which contains it; and that the Savages anoint with it the Gins they ſet for theſe animals, to draw them thither.

Fourthly, his *Teſticles* not faſtned to the Back-bone, as ſeveral Authors affirme, but on the ſides of the *Os pubis* about the groyne, altogether hid, and not appearing at all, no more than the *penis*, before the skin was remov'd. The *Penis* contrary to that of a Dogg, which goes from the *Os pubis* to the Navil, deſcended here downeward to the vent of the excrements, at which hole it did terminate.

Fifthly

Fifthly, the *Heart* had its left Auricle bigger than the right (which is alſo found in ſome other animals;) whereas in Man 'tis contrary. They found no *foramen Ovale*, which many Authors aſſure to be in all Amphibious Animals, and even in Men, that are *Divers*, and ſtay long under water. But it may be, that this *Caſtor* having been kept divers years from going into the water, that hole had been cloſed.

But we muſt proceed to the *Dromedary*, wherein is chiefly noted; *that* it hath but two ſmall hooffs on the end of his feet, the ſoles of them, flat and large, being very fleſhy, and covered onely with a ſoft, thick and little callous skin, proper enough to march in the Sands of Aſia and Africa; *that* the ſix *Calloſities* of his Leggs being open'd, their ſubſtance was found to be between fleſh, greaſe and ligament, ſome having a collection of a thick purulent matter mixed; *that* that Calloſity under the Breaſt, ſtrongly faſtned to the *Sternum*, was conſiderably bigg every way, and much ſuppurated; *that* his inward parts were like enough to thoſe of an Horſe; but that in his 2d Ventricle there were many ſquare Openings, being the Entry of about 20. cavities, made like ſacks, placed between the two membranes that compoſe the ſubſtance of the whole ſtomach, in which ſacks, as in convenient receptacles, 'tis probable that Camels doe for a long while keep the water they drink in great quantity, when they meet with any, for a ſupply in dry and deſert places; *that* the *Lungs* had but one lobe; *that* the *Heart* was extraordinary bigg, *viz.* 9. inches long and 7. large; *that*, contrary to other Tongues, which are every where rough from within outwards by ſtore of ſmall eminences tending from *without* inwards, a part of this *Tongue* had them from *within* outwards *&c.*

The *Bear* hath a very particular ſtructure of his *Leggs*, and their ſubſtance, very good to eat, is a kind of thick fattiſh ligament, out of which may poſſibly iſſue that moiſture, which Authors ſay is ſuckt by this Beaſt for its nouriſhment in winter. Its *Claws* differ from thoſe of a Lyon; by being more equall and more compact. The *Teeth* differ from thoſe of a Lyon in this only, that they are leſs. The *Thorax* conſiſts of 14 Ribbs. There appeared no diſtinction in his *Gutts*, as in other animals;

they were 40. foot long, whereas thoſe of the *Lyon*, formerly diſſected by the ſame Obſervers, had but 25. The *kidneys* had a very peculiar ſtructure, *viz.* a membrane containing 56. ſmall kidneys, actually ſeparate from one another, each cover'd with its proper membrane; here and there connected by very fine fibres; every one having a large *baſe* outwards, and ſtreightning it ſelf inwards; that *baſe* being in ſome a Hexagon, in the moſt a Pentagon, and in others Square; and the whole repreſenting as 'twere a ripe *Pine-apple*: therefore probably ſo bigg, and divided into ſo many ſmaller kidneys, that it might containe and evacuate the greater plenty of ſeroſities, to be found in a Bear, becauſe he hath but little of inſenſible tranſpiration, by reaſon of the thickneſs of the habit of his body, not favourable for it. The *Brains* they obſerv'd to be 4. times bigger, than that of the Lyon they open'd. The *Eyes* exceeding little, the *Chryſtallin* very odly ſcituated, and drawn on one ſide of the *Axis* of the Eye.

But that which is particularly taken notice of in the deſcription of this Animall, is, 1. The ſtrength of its Temper and conſtitution, by which it is able, though it have but a little ſtomach, and ſtreight gutts (among which there is no *Cæcum*) to digeſt with eaſe all ſorts of edibles, raw fleſh, Fiſh, Lobſters, Inſects, Herbs, Fruits, Hony; ſupplying by the force of his temper the defect of a commodious ſtructure. 2. The ſmall capacity of its *Liver* and *Spleen* to receive excrementitious matter; which argues, that the action of the naturall Heat is ſo well regulated, that 'tis not ſubject to defect or exceſs. 3. The ſingular faculty of encreaſing to a great bulk, by which, though it be born exceeding ſmall, it grows a very big animal, its natural moiſture being ſo perfect, as to render the parts capable to extend themſelves, and to increaſe their magnitude without leſſening their ſtrength.

The *Gazelle* or wild African Shee-goat (the ſame with the *Dorcas* or *Strepſiceros*) was of the bigneſs and ſhape of an Hind, its hair fallow, except that of the belly, which was white; its Eyes big and black; the Horns black alſo, ſtreak't croſs--ways, 15. inches long, very ſharpe, pretty ſtreight, but a little turned outwards about the middle; in part hollow, and by a ſharp]bone faſtn'd to the Head. Tooth-leſs in the upper Jaw, as being of the ruminating kind. Very cloven footed; and ſmal-hoofed before, but thick-fleſh't on the hinder parts of the leggs, like a Camel.

As to the inward parts, it had a ***Liver*** ſhaped like that of a man, divided into two Lobes; and in the hollow part of the Liver there were two *Lymphatick* branches, which faſtn'd the trunk of the *Vena porta* to the ſuperiour Orifice of the Stomach. The ſubſtance of this Liver plainly appeared to them glandular, each grain of it being pierced, as they thought, in the midle, by reaſon of a little red cleft they had, whence iſſued blood, when preſſed. And the cauſe, why theſe glandules ſeldome appeare vnſevered one from another, may be, that when the animal is in health they are ſpungy and fill'd out with bood, which they are not, when it is ſick, or emaciated, *&c.*

III. LABYRINTHUS ALGEBRÆ, Auth. *JOH. JAC. FERGUSON. Printed at the* Hague *in* 4°. *1667.*

What we mention'd in *Numb.* 46. p. 931. ſect. 8. about new methods, pretended by ſome to be found out for giving the Roots of all Cubick and *Bi-quadratick Æquations*, albeit thoſe Roots are Fractions or Surds, Binomials or Reſiduals; We find ſince to be already accompliſhed by this Dutch Writer; upon the Curſory peruſal of whoſe Book we take the firſt part of it to be, as follows.

1. He ſhows, how to extract the *Square* and *Cubick* Roots out of *Binomiall* and *Reſidual* Numbers, as a *medium*, which he afterwards hath occaſion to uſe.

2. Then proceeds to give one general Rule for finding the Roots of all *Quadratick* Æquations, and commends the worth of his method from the eaſineſs, although you be incumbred with Fractions or great Numbers either in the Coefficients or Abſolute.

3. He gives one General Rule (where others make more Caſes of it) for finding the Roots of all *Cubick* Æquations, in which the Second term or *Quadratick ſpecies* is *wanting*, and then ſhows, how all other *Cubick* Æquations, wherein it is *preſent*,

may be reduc'd thereunto, by taking it away. Moreover, when ſuch Æquations, wherein you are incumbred with *Fractions* or *Surds*, either in the Coefficents or Roots, are propoſed, he goes on to find the Roots, ſought in his own method, and when not explicable but by a *quám proximè*, according to the general method of *Vieta*, in the uſe of which method, he, determining the number of Figures in the Root, takes away the trouble of all the ſub-gradual Punctations.

4. When he comes to *Bi-quadratick Æquations*, he intimates, that all ſuch Æquations may be reduced into two *Quadratick* Æquations, but not without the aid of a *Cubick* Æquation: And firſt, when the ſecond Term or *Cubick Species* is not wanting, he ſhews how to find the ſaid *Adjutant Cubick* Æquation, by placing the two higheſt Terms of the Æquation on one ſide, and the reſt of the Termes on the other, and then finds ſuch Quantities, which, added to either ſide, render the ſame capable of a ſquare Root; and this preparation being made, he thereby obtains the *Cubick* Æquation and the Root thereof, which ſerves for the purpoſe premiſed; to wit, to divide the *Bi-quadratick* Æquation propos'd into two *Quadratick* Æquations, and ſo ſolved.

Further, in regard that all Æquations are more eaſily ſolv'd, when ſome of their Terms are wanting, than when all are preſent; he proceeds to ſhew, how to take away the *ſecond* Term, and, ſuppoſing it gone, gives eaſier Rules for finding the aforeſaid *Cubick*-

Æquation; by aid whereof, the propos'd *Bi-quadratick* Æquation may be divided into two *Quadratick* ones, as before.

And then, in regard it often happens, that Æquations are not otherwiſe explicable than by a *quàm proximè*, he proceeds according to the General method of *Vieta*, as in *Cubicks* laſt above mention'd.

The whole Doctrine is illuſtrated with great variety of choice Examples, and the Author intending hereafter to treat more fully of *Algebra*, promiſeth to extend his methods to Æquations of *higher* degrees, and to render the ſame more general. The remainder of the Book doth principally treat of *figurate* Arithmetick.

And here we think it fit to intimate, that divers good Treatiſes of *Algebra* have been lately publiſh't in *Low Dutch*. This Author cites Queſtions out of the 3d *Century* of *Queſtions* in the *Officina Algebræ* of *Marten Wilkins*, which we have not ſeen. *Gerhard Kinkhuyſen* hath of late years publiſh'd ſeveral diſtinct *Quarto*-Books, *viz*. A *Tract* of *Analytical Conicks*: A *Collection* of *Geometrical Problems*, *Analytically* ſolv'd; as alſo ſuch an acceptable *Introduction to Algebra*, that by the encouragement of ſome of the *R. Society* it hath been Tranſlated into *Latine*, and fitted for the Preſs; to which will be annexed the *Methods* and *Examples* of *Ferguſon* about the *Roots* of *Æquations*. And we have little reaſon to doubt, but that the juſt now mention'd *Introduction* will meet with ſuch an acceptance, as ſhall quicken the

Stationer to proceed in the Tranſlation and Printing of the reſt of the Books above-mentioned, or others of the like kind.

Ferguſon about the Matter mention'd is more full than either the *Algebra* of *Frans Van der Huips*, an *Octavo* Book in *Low Dutch*, 1654. or *Kinkhuyſen*: neither do we find, that *Ferguſon* aſcribes the Invention of thoſe Methods to himſelf.

IV. *AN ANSWER* to *HYDROLOGIA CHYMICA*, of WILLIAM SYMPSON, by ROBERT WITTIE, M. *D. Printed for* John Martyn *at the* Bell *without* Temple-Barr, *in* 8° 1669.

The Learned Author in this Anſwer undertakes to prove, that all the Mineral Ingredients, which he in his Firſt Book on this Subject affirm'd to be in the *Scarborough-Spaw*, are really there, and that his Antagoniſt himſelf, unawares, acknowledges them to be there; ſo that the judicious Reader of both theſe Authors will find, that the difference between them, whether in the Matter, which concerns thoſe Ingredients of the ſaid waters, or in that which reſpects the two ways of practiſing Phyſick, the *Galenical* and *Chymical*, is indeed not ſo great, as the heat of Contention ſeems to make it.

And certainly, if the Profeſſors of this Art would but lay aſide Animoſities, perſonal Reflexions, and private Conſiderations; and withall acknowledge, as they ought, that new and great diſcoveries may be made by careful Obſervations and Experiments, they would eaſily agree and joyn together, not only their Parts, Natural and acquired, but alſo the two ſo much celebrated methods of adminiſtring Phyſick, for curing both acute and chronical or contumacious Diſeaſes; which is the true way to do ſervice indeed to Mankind, and to entertain and raiſe the Credit of that Profeſſion.

Nota. *By the overſight of the Printer, ſome Lines were left out to the breach of the Senſe, in the Authors Animadverſions upon Mr.* S. *his Epiſtle, at the bottom of the* 3d *Page, which may be thus corrected*; Like that of the Travailer that went from *Jeruſalem* to *Jericho*, who fell among Thieves that ſtript and wounded him, 'tis no fault of mine; my work ſhall be like that of the Samaritane, *&c.*

ERRATA.

NUmb. 48. p. 962. l. 7. *l. Genetricem.* In the preſent Numb. p. 981. l. 18. *l. ſcaled wings.* p. 983. l. 31. *l. occaſion'd.* p. 987. l. 26. *l. beſides thoſe of.* p. 992. l. 3. *l. Shoulders.*

LONDON,
Printed by *T. N.* for *John Martyn* Printer to the *Royal Society*, and
are to be ſold at the *Bell* a little without *Temple-Bar*, 1669.

PHILOSOPHICAL TRANSACTIONS.

Auguſt 16. 1669.

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An Invention For *Eſtimating the* Weight of Water in Water *with ordinary Ballances and Weights.*

THe Author of this Invention is the Noble *Robert Boyle*; who was pleas'd to comply with our deſires of communicating it in Engliſh to the Curious in *England*, as by inſerting the ſame in the *Latin* Tranſlation of his *Hydroſtatical Paradoxes* he hath gratified the Ingenious *abroad.* And it will doubtleſs be the more welcome, for as much as no body, we know of, hath ſo much as attempted to determine, *How much* Water may weigh in Water; and poſſibly if ſuch a *Problem* had been propos'd, it would have been Iudged impracticable.

The Method or Expedient, he made uſe of to perform it as near as he could, may be eaſily learned by the enſuing accompt of a Tryall or two, he made for that purpoſe, which among his Notes he cauſed to be regiſtred in the following words.

A Glaſs-buble of about the bigneſs of a pullets-egg was purpoſely blown at the flame of a Lamp, with a ſomewhat long ſtem turn'd up at the end, that it might the more conveniently be broken off. This Buble being well heated to rarify the Air, and thereby drive out a good part of it, was nimbly ſealed at the end, and by the help of the figure of the ſtem was by a convenient Weight of Lead depreſſed under water, the Lead and Glaſs being tyed by a ſtring to one Scale of a good Ballance, in whoſe other there was put ſo much weight, as ſufficed to counterpoiſe the Buble, as it hung freely in the midſt of the water. Then with a long Iron *forceps* I carefully broke off the ſeal'd end of the Buble under water, ſo as no Buble of Air appear'd to emerge or eſcape through the water, but the liquor by the weight of the Atmoſphere ſprung into the un-repleniſht part of the Glaſs-buble, and fill'd the whole cavity about half full; and preſently, as I foretold, the Buble ſubſided and made the Scale, 'twas faſtned to, preponderate ſo much, that there needed 4. *drachms* and 38. *graines* to reduce the Ballance to an *Æquilibrium.* Then taking out the Buble with the water in't, we did, by the help of the flame of a candle, warily apply'd, drive out the water (which otherwiſe is not eaſily excluded at a very narrow ſtem) into a Glaſs counterpoiſed before; and we found it, as we expected, to weigh about 4 dramchs and 30 graines, beſides ſome little that remained in the Egg, and ſome ſmall matter that may have been rarified into vapors, which added to the piece of Glaſs that was broken off under water and loſt there, might very well amount to 7. or 8. graines. By which it appears not only, that water hath ſome weight in water, but that it weighs very near * or altogether as much in Water, as the ſelf ſame portion of liquor would weigh in the Air.

* *This expreſſion was added, to leave Liberty for a further inquiry, Whether the Experiment, which hereby appears convincing as to the main thing intended to be proved may not admit the having ſomething further debated, and annext about ſome circumſtantial thing or other.*

The ſame day we repeated the Experiment with another ſealed Bubble, larger then the former (being as bigg as a great Hen-egg,) and having broken this under water, it grew heavier by 7. *drachms* and 34. *graines*; and having taken out the Buble, and driven out the water into a counterpois'd Glaſs, we found the tranſvaſated liquor to amount to the ſame weight, abating 6 or 7 *graines*, which it might well have loſt upon ſuch acccompts, as have been newly mentioned.

An Extract of a Letter

Written by Mr. Joſhua Childrey *to the Publiſher, containing an Accompt of a paſſage by ſea to the* Eaſt-Indies, *communicated to him by that Ingenious Travailor Mr.* Richard Smithſon *Who made two voyages into thoſe parts.*

FRom *England* to *Cape Finis Terræ* in *Gallicia* in 44. degr. *North Lat.* the Winds are as variable as with Us; onely the Bay of *Biſcay* is more ſubject to ſtorms, and the Sea more rough, and the Waves running very high.

From thence to 34. degr. The Wind is variable alſo, but if you be within 100 leagues of the *European* Continent, it is generally inclined to *North-Eaſt*.

From 34 degrees, if you be inclining to the coaſt of *Africa*, or about the Meridian of the *Canaries*, the Wind is ſo certain, and conſtantly at *North-Eaſt* (or within two points) that it is rare to find it otherwiſe. Yet in Winter, upon the coaſt of *Africa* there are ſometimes Weſterly ſtorms, that are violent, but of no long continuance. And in Summer, when it is ſometimes calme, the Air will come variably. Theſe *North-Eaſt*-Winds hold moſt commonly to 8. degrees *North-Latitude*, and then begin the *Tornado* Winds, which are moſt part confined between 8. and 4. degrees *North-Latitude*. They are ſeldome or never more Southerly; but on this ſide the Line they have ſometimes been met between 11. and 12. degrees *North-Latitude*, and ſometimes in 9. and 10. degrees. Theſe *Tornadoes* are vncertain winds, blowing from all points of the *Compaſs* in the ſame hour, and ſometimes the wind ſhifts thus without being intermitted, and other whiles it will be ſtark calme, almoſt between every puff. They are ſo confus'd, that let 4. or 5. Ships ſail together as near as is fitting for Ships that keep company, at the ſame inſtant many times every Ship ſhall have a ſeverall and contrary wind. And this place is almoſt alwayes infeſted with horrible thunders, lightnings and rain. And the nearer you are to the *Africk*-ſhore, ſo much more dreadfull is the Thunder and Rain: but the further *Weſt-ward* you goe, the Thunder and Rain will be leſs, and the Winds not ſo vncertain; ſo that, if you go as farr Weſt, as the Meridian of the Eaſt-ſide of *Braſile*, there is little Thunder, neither doth the Wind come down in ſuch puffs and flawes; but between 4. and 8. degrees it is moſt inclined to Calmes, and very great and thick Foggs, and the Raines come not in ſuch violent ſhowers.

Likewiſe this is a ſure rule, that near the *Africk*-ſhore, and ſo for 100. or 200. leagues *Weſt*, the *North-Eaſt*-Winds commonly incline more and more to the *Eaſt*; ſo that by that time, you come to the Weſt of the Meridian of the *Azores* about 20. degrees, the *Trade* or conſtant Wind will be moſtly *Eaſt-North-Eaſt*.

Now as from 34. degr. to 44, near the Continent of *Europe*, the Winds are commonly between *Eaſt* and *North*; ſo after you come ſo farr Weſt as the Meridian of the hithermoſt of the *Azores*, they are commonly between *South-Weſt* and *North-Weſt*. And for this reaſon Ships, that are outward bound to the *Streights*, keep near the coaſt of *Portugall*, but homeward bound they are many times forced to run farr *Weſt* to fetch a Weſterly wind. Likewiſe Ships bound to the *Barbados* go by the *Canaries*, but come home a great way to the *North-Weſt* of the *Azores*. And the *Virginia*-ſhips are twice as long in going out, as they are in comming home, and many times longer: for, they come home befor the Wind directly, but goe out round about as the *Tropick*, or at leaſt to 28 degrees Latitude for the benefit of the *North-Eaſt*-Wind; and when that hath carried them farr *Weſt*, they come back to the *Nordward* again: and then, as the Weſterly wind hangs more or leſs Southerly, they have a good or bad paſſage.

Between 3. or 4 degrees *Nothern Latitude* the *South-Eaſt*-Wind begins to take place between the *Æquator* and the *Tropick* of *Capricorne*. But the nearer you are to the coaſt of *Africa* it is ſo much more *Southerly*; and as you approach to the coaſt of *Braſile*, it inclines more and more *Eaſterly*. And there is not only a Variation in the Wind in reſpect of *Longitude*, but alſo in reſpect of *Latitude*: for, near the *Æquator* the wind is more *Southerly*, than it is in the ſame Meridian near the *Tropick* of *Capricorne*; as for example, in the great Bay of *Guinea* (which our Seamen call the *Bight of Guiny*) the Wind (as I have been credibly inform'd) is moſtly *South*; and inclines as much to the *Weſt* as to the *Eaſt*: but in the ſame Meridian near the *Tropick of Capricorne* I am ſure it is conſtantly between *South-Eaſt* by *Eaſt*, and *South-Eaſt* by *South*. And on the contrary in that Meridian, which may be about an 100. Leagues to the *Eaſtward* of *Braſile* near the *Æquator*, the Wind is between *South-Eaſt* and *Eaſt-South-Eaſt*; and in the ſame Meridian the Winds near the *Tropick* are more variable, but moſt part about *North-Eaſt*.

This, I ſuppoſe, is as much as you deſire for the Winds *within* the *Tropick*: and when I have told you, that in our latter Voyage from the *Line* to the *Tropick* of *Capricorne* we had many Calms, and what winds we had were very ſmall, which was in the latter half of *April* and the former half of *May*, but in our firſt Voyage in the latter half of *May* 1657. great ſtorms; I have ſaid all I can.

The Stormy days were May 16 17 18 eſpecially the 17th in 7 degrees *Southern Latitude*. Alſo the 20th and 21 in the Latitude of 12 and 13 degrees; and the 27th at night in *Southern* Latitude of 22. degrees; which ſtorme was the moſt ſudden and unexpected that ever I ſaw: for all day it was very fair weather, and ſo till 8 at night, and the wind at *North-Eaſt*, but on a ſudden came a violent ſtorm of wind at *South-Weſt*, and in a moment the whole heavens were become black and prodigiouſly dark, which continued till 4 the next morning, with intolerable rain; and then the wind came again at *North-Eaſt*, and it was preſently fair.

Near *Affrica* the *South-Eaſt*-winds hold to 28. or 29. degr. *Southern Latitude*; but towards *Braſile* from the *Tropick* of *Capricorne* to 32 degrees they are variable, and to the Southward of 32. Weſterly; as you may perceive by this following accompt.

May 29. Latit. 24. 47′. Longit. (by the plain Sea-chart) from the *Lizard*, 11. Degr. Weſt; Variation 10d 7′ Eaſt: fair Weather; the Wind from S W to W. We ſailed 50. miles.

June 1. Little wind, at S W.

June 2. Latit 26. 0 Calme all day, and a great ſtorm all night at South.

June 3. Strong wind at S S E. At 1. at night it came to E b S. and blew with the ſame violence till next day noon. At *6.* in the Evening I ſaw *Mercury* very near the *Moon*, newly paſt Conjunction, as I ſuppoſed.

June 4. Latit. 26. 15′. South. Longit from the *Lizard* *9.* 24. Weſt: the Wind moderate at E bS.

June 5. Latit 27. 32′. a freſh gale at E b N; dark and cloudy, but no rain.

June 6. and 7. the ſame Wind and Weather.

June 8. darke day, and calme all day and night.

June 9. calme till mid-night; then a little Wind at N W.

June. 10. Latit. 32. degr. Calme all day, and till midnight; then a freſh gale at N W, that we ſailed *66.* miles. This day we ſaw a great Number of Whales ſporting themſelves.

June 11. Latit 32. 43′. the firſt clear day we had in a fortnight. Strong wind at N W. We ſailed 141. miles.

June 12. Latit. 33 44′. Long. 5. deg. Weſt. Variat. *9.* 40′. Eaſt: Clear weather, till the latter end of the night; then it rain'd: Strong wind at W N W, and a ſmooth ſea; ſo that we ſailed this day 177. miles; the moſt that our Ship ſailled in 24. houres in all the time of the two Voyages, that I ſayled in her.

June 13. Latit. 34. 15′. South. Longit. 2. 7′. Weſt. Violent wind At 4. p. m. it ſhifted ſuddainly from W N W to W b S. At 10. at night to S W b W; after midnight, to S W b S; about 4. to S S W.

June 14. very great wind at S S W About mid-night it ſhifted to W; and immediately follow'd a very terrible ſtorm of Wind and rain, and a great over-grown Sea.

June. 15. at 7. in the morning the wind came back again to S S W. the whole day was a very dreadfull ſtorm of wind. At noon (by accompt) we were in 34. 42. South. Latitude, and 3. 20′ to the Eaſt-ward of the Meridian of the *Lizard.* The ſea was exceedingly rough. At 4. p. m. fell a great ſtorm of Hail. At night was a great *Eclipſe* of the *Moon*, which I could not at all obſerve my ſelf, becauſe the Storm raged at the time of the Eclipſe more than ever, the waves ſo beating over the ſhip, that I could not be upon the deck: but the Maſters Mates, who had the watch (to whom I gave charge concerning it) ſaid, that ſhe begun to be totally dark about half a quarter paſt 8, and began to recover ſome of her light 2. minutes before 9; as we reckoned the time by our Glaſs. As ſoon as the Eclipſe was ended, the ſtorm began to abate, and the raging of the Wind and Seas ſo calmed, that by morning we ſet up our Top-ſailes.

June 16. a little before Noon the wind came to Weſt, and continued a ſtrong gale but with fair weather.

June 17. Latit. 35. South. Longit. (from the *Lizard* 7½ degr. Eaſt. Variation 2. 30′. Eaſt. We ſaw many great heaps of weeds in the Sea, and a great roling Sea came out of the South. A ſtrong wind (without guſts) all this 24. houres at Weſt. P. M. the sky was extream foul and thick, ſo that we fear'd more bad Weather. It continued ſo till 7. at night; and then 6. or 7. minutes it became as clear as Chryſtal (to our great admiration at ſo ſudden a change,) and ſo continued all night.

June 18. a very ſtrong wind at Weſt: a darke day and clear night. We ſailed 170. miles Eaſt.

June 19. the ſame wind and weather.

June 20. the wind much abated.

June 21. was the firſt clear day we had this month. Latit. was 35. 40′. South. Longit. 17. 40′. Eaſt-ward, from the

Lizard. Variation, 1. 4′. Weſt. The Wind was at N W. till 4. p. m; then it came to Weſt with a thick sky and cold rain. At 8. to W S W. At 3. in the mornig to *S* W, and at 6. to *S S* W. At 9′ the next day to *S*outh; all ſtrong winds.

June 22. dark and cloudy. At 2. of the clock the wind came to *S S* E. At 4, to E *S* E. At 10, to Eaſt, and there continued till the 24th in the morning; which all accounted very ſtrange.

June 24. in the morning it fell calm, and was pretty warm, having been bitter cold the laſt 10. dayes.* At 3 a clock in the night a freſh gale at N N W.

June 25. Latit. 36. 10′. Longit. 21. 25′. Variation 3. 40′. Weſt. Fair weather Wind N N W

June 26. A clear day. Wind N N W. Variation 4. 30′.

June 27. in the morning calm about 9, wind and rain out of the *S* W. At night calm and fair.

June 28. A fair day, and moſt part calm; for we ſailed but 17. miles in 24. houres. At 10. at night, heaving the *Lead* we had ground 130. fathoms, the ſand like *Calais*-ſand. The Variation was 7. 10′. This was off Cape *Agulhas*, the moſt *S*outherly Land of all *Africa*, lying 90. miles E *S* E. from the Cape of *Good Hope*.

In our latter Voyage, after we came to 32. degr. *S*outh. Latitude (to which the place from the *Line* we were much becalmed) we had fair weather, and a conſtant Wind between W N W and W *S* W. all along to the Cape (and ſo it was moſt commonly;) and I have therefore noted the weather in the former Voyage, becauſe it was un-uſuall; in that vaſt ſpace between *Rio dela Plata* and the *Cape* the wind being all the year Weſterly. But about the *Cape* from the end or middle of *September* to the beginning of *April*, the winds are variable as in *England*. The reſt of the year they are Weſterly, and intolerable ſtorms.

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* *This Obſervation of the* bitter Cold *in the Southern Latit. of between 35. and 36. degrees may be referred to thoſe related by Mr.* Boyle *in his* Experimentall Hiſtory of Cold *p.* 491; *whence he raiſeth this Note:* That the greater or leſſer Coldneſs of the Air in ſeveral Climates and Countrys is nothing near ſo regularly proportioned to their reſpective diſtances from the *Pole*, or their Vicinity to the *Æquator*, as men are wont to preſume.

I can give you no accompt of any thing to the Southward of 37. degrees; thoſe few Ships, that have adventured to 38, reporting the Winds and Seas ſo raging, that none dare goe further.

Some conſiderations touching the variety of Slate, *together with a computation of the Charges in generall, for Covering Houſes therewith; by Mr.* Sam. Colepreſs.

WHereas among the Materials for Building, that for *Covering* is not the leaſt to be conſidered, among the kinds thereof our Contry-ſlate is not to be deſpiſed, and that as well for its *Statelineſs*, as *Permanency*; to which may be added its *Cheapneſs*. The *firſt* whereof needs no better Evidence, than the Eſteem, the ſlated Houſes in or about *London* (though there are many of them) generally meet with from all, that but take notice of them. For the *Second*, we have ſome ſorts, which by the conjectures of the moſt experienced *Helliers* (or Coverors with Slat) have continued on houſes ſeverall hundreds of years, and are yet as firm, as when firſt put up. And for the *third*, the computation of Charges, annexed below, may give ſome hints, as eaſily to gueſs at the whole Charge thereby, as compared with Tiling, Leading, Boarding *&c.* (comparatis comparandis.)

I ſhall therefore the leſs ſcruple to offer ſome occaſional Trials (though common ones, for ought I know,) whereby the firm and laſting goodneſs of any Slate may eaſily be experimented and without expence.

1. Take the thin cleft ſtone, ſlat or ſhindle, and ſo knock it againſt any hard matter, as to make it yield a ſound, If the ſound be good and clear, that ſort of ſtone is not crazy, but firm and good. Or

2. If in hewing it does not break before the edge of the *Sects* (the hewing inſtrument of the Slatters) you may not much doubt of the firmneſs of the Slat. But

3. If after it hath been exactly weighed (and the accompt thereof laid by) it be put, and for 2. 4. or 8. hours left to remaine all under water in a veſſel; and afterwards taken up

and

and wiped very clean with cloaths, if then it weigh more than before, 'tis of that kind, which imbibes water, and therefore not ſo fit to endure any conſiderable time without rotting the laths and timber.

4. Theſe Stones may be pretty well gueſſed at, whether they be of a cloſe or looſe texture, by their *Colour*: For the *overblackiſh Blew* is apteſt to take in water; but the *lighter blew* is alwayes the firmeſt and cloſeſt. To which may be added the *Touch*; for, a good ſtone feels ſomewhat hard and rough; whereas an open ſtone feels very ſmooth, and as twere, oily.

5. Place your Stone longways perpendicular in the midſt of a Veſſel of water (no matter, how ſhallow the water be, ſo it exceed halfe a foot depth;) and be ſure, the upper un-immerſed part of the Stone be not accidentaly wetted by the hand, or otherwiſe; and ſo let it remaine a day, or halfe a day, or leſs. If it be a good firme ſtone, it will not draw (as they ſpeak) water above half an inch above the level of the water, and that perhaps but at the edges only, the parts of which might be ſomewhat looſen'd in the hewing. But a bad ſtone will draw water up to the very top, be the ſtone as long as it will, all over.

As for the Charges of Covering Houſes with Slate, they may be thus computed.

	ſh.	d.
1000. of *Efford ſmall blew* at the ſhips ſide in Plimouth harbor	5	6.
1000. of *Efford large blew*	9	9.
1000. of *Can* pelmel	7	0.
1000. of *ſmall blew* of other Quarries	4	0.
1000. of *large blew*	8	0.
3000. of ſmall blew, accompted 2. Tuns in carriage by water		
1000. of large blew, 1. Tun		
3000. of ſmall will cover 1. *Poole* of work at the fifth pin plaine.		
Every Poole of work is either 6. foot broad and 14 foot up, on both ſides, or 168 foot in length, and one in breadth.		
3000 of large will cover 2. Pooles of plain work		

	ſh.	d.
Hewing of all ſorts of plain pelmell *per* 1000	1	6.
Pinning *per* 1000 8d: Pins *p* 1000. 8d	1	4.

Three buſhels (*Wincheſter* meaſure) of good Lime will take 6. buſhels of freſh water ſand, and ſerves to lay on one Poole of work; though much leſs may ſerve the turn,

300 of lathes to every Poole of work.

1000 of Lath nailes to every 300 of Lathes.

An able workman may { lath 1. poole of work
lay on 2000 or more of ſlate
hew 1500 plaine
pin 4000 } by the day.

Chequer-work conſiſts in Angles, Circles and ſemi-circles *&c.* which requires no common skill, and time in hewing and laying.

It is worthy obſervation, that if a ſide-wall happen to take wett by the beating of the weather, or the like, when nothing elſe will cure it, our kerſeing with Slate (which is much uſed in the curious fronts of houſes, eſpecially in Townes) will quickly remedy it.

Some Obſervations

Concerning the odd Turn *of ſome* Shell-ſnailes, *and the* darting of Spiders, *made by an Ingenious Cantabrigian and by way of Letter communicated to Mr. I.* Wray, *who tranſmitted them to the Publiſher for the R. S.*

Sir, I Can deny you nothing, and you may doe what you pleaſe with the Notes I ſend you. You would know of me (you ſay) what I have obſerved concerning the *Odd Turn* of ſome *Shell-ſnailes* with us in England, and the *Darting of Spiders*.

I will tell you then of the *firſt*, that I have found two ſorts of them, eaſily to be diſtinguiſht one from the other, and from all beſides, becauſe the *Turn* of the wreaths is from the right hand to the left, contrary to what may be ſeen in common Snailes. They are very ſmall, and might therefore well eſcape thus long the more Curious Naturaliſts; neither of them much exceeding, at leſt in thickneſs, a large Oat-corne.

The *firſt* I thus deſcribe: The open of the ſhell is pretty round, the ſecond turn or wreath is very large for the proportion, and the reſt of the wreaths, about the number of ſix, are ſtill leſſen'd to a point. This Turben or Conical figure is well neare a quarter of an inch; the colour of the ſhell is duſkiſh, yet when the ſhrunk animall gives leave, you may ſee day through it, and then it is of a yellowiſh colour. Theſe ſhells are extreame brittle and tender, ſo that I cannot ſend them in a Letter: You may gueſs at the figure, if I tell you, they are ſome-thing like thoſe of *Aldrovandus de Teſtaceis*, markt p. 359. *Turbinum levium.*

Of the *ſecond* ſort I ſend you incloſed at a venture halfe a dozen; (you ſee, in that I can ſo plentifully repair the loſs of the former, that they are not very rare; (they ſeem to be much ſtronger and thicker ſhell'd; they are well near half as long again as the other, and as ſlender; they have the exact figure of Oat-corn, being as it were pointed at both ends, and the middle a little ſwelled. The open of the ſhell is not exactly round there being a peculiar *Sinus* in the lower part thereof. I think, you may number about 10. Spires, having their turn from the right hand to the left. The colour of the Shell is of a dark and reddiſh brown.

There are two ſorts of this make deſcribed, and with their reſpective Cutts, in *Fabius Columna*; but ours agree not with them in any thing more than the odd Turn: though 'tis true, that the other, the third there deſcribed, and call'd by him *Cochlea Terreſtris turbinata et ſtriata*, is very frequent in the road 'twixt Canterbury and Dover, and likewiſe in ſome wooddy parts of the Woles in Lincoln-ſhire. There are odd differences in this very Snaile very remarkable, as its having but one pair of horns (if I miſtake not,) as alſo a hard ſhelly cover; its manner of wearing that cover *&c.* which I leave to another opportunity and place.

And to return to our two now deſcribed Snailes, they, when they creep, lift up the point of their ſhells towads a perpendicular, and exert with part of their body two pair of horns, as moſt of their kind doe.

In *March* they are ſtill to be found in paires, *Ariſtotle* affirmes all theſe kind of creatures to be of a *ſpontaneous* birth, and no more to contribute to the production of one another, than Trees, and therefore to have no diſtinction of *Sex*. I have no reaſon to ſubſcribe to his authority, ſince I have ſeen ſo many of them pair'd, and in the very act of Venery. That they engender then, is moſt certain; but whether thoſe, that are thus found coupled, be one of them male, and the other female, or rather, as you obſerv'd, and publiſhed to the World in the *Catalogue of Plants* growing Wild about *Cambridge*, that they are both male and female and do in the act of generation both recieve into themſelves, and immit a like *penis* (as it ſeems probable to any man that ſhall part them) I leave to further and more minute diſcovery to determine.

Moreover, we find in *Ariſtotle* a Circle of other parts, but of theſe no mention at all. However the Romans knew ſomething extraordinary of theſe kind of Animals, that made them ſo choice of them, as to reckon them among their moſt delicate food, and to uſe all care and diligence to breed and fat them for their Tables at large deſcribed to us by *Varro*. Their taſt and reliſh is none, methinks, of the moſt agreeable.

Of late, comparing *Buſſy's Hiſtoire Amoureuſe de Gaule* with *Petronius Arbiter*, out of whom I was made to believe, he had taken two of his Letters word for word, beſides other Love-intrigues; I found, in running him over, what ſatisfied me not a little in this very ſubject of *Snailes*; *viz.* That theſe very Animals, as well as other odd things in Nature, as *Truffs*, *Muſhroms*, and no doubt too the *Coſſi* or great Worms in the Oak (another *Roman* dainty) were made uſe of by the Antients to incite Venery. You'l there find, that the diſtreſſed and feeble Lover prepares himſelf with a ragouſt of Snailes necks (*cervices Cochlearum*;) and indeed in this part it is that theſe ſtrange *penes's* are to be found.

Mr. *Hook* does as it were promiſe the Anatomy of this Inſect. It were ſurely worth his pains, and the Learn'd World would be oblieged to him for a piece of this nature; nothing, accurately done of the inward part of any inſect, being yet publiſht *.

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* *When this was written*, Malpighius de Bombyce *was not yet publiſht.*

Theſe Snailes are to be found frequent enough under the looſe bark of Trees, as old *Willows*, and in the ragged clefts of *Elmes* and *Oak &c.* and in no other place elſe, that I could obſerve.

You tell me, that it is generally concluded by Philoſophers, That the reaſon of the uſuall *Turn* of *Snailes* from the left to the right, is the like motion of the Sun, and that eſpecially more Nord-ward, there having not been hitherto diſcovered any in our parts of the contrary Turn to the *Sun's* motion. But this is not the only caſe, where they are out, who conſult not the Stores of Nature, but their own phancy. What I am further about to tell you concerning *Spiders*, is as evident an Inſtance againſt them.

The *long Threads* in the Air in Summer, and eſpecially towards *September*, have been a ſtrange puzel to the wiſer World. It would divert you, though you know them as well as I, if I here reckoned up the ridiculous opinions concerning them; but I omit them, and proceed to tell you the certain and immediate Authors of them; and how they make them.

I ſay then, that all Spiders, that ſpin in a thread, (thoſe, which we call *Shepherds* or long-legg'd Spiders, never doe;) are the makers of theſe threads, ſo much wondred at, and in ſuch infinite quantities every where.

I ſent you the laſt Summer a Catalogue of *thirty* ſorts of Spiders, that I had diſtinguiſht here with us in England; and I muſt confeſs, I hid well near compleated that number, with many other Experiments concerning them, before I diſcovered this ſecret. You muſt not expect here from me any thing more, than what you demanded of me; for as for other Experiments, I reſerve them till our meeting.

I had exactly mark'd all the ways of Weaving, uſed by any ſorts of them, and in thoſe admirable works I had ever noted that they ſtill let down the Thread, they made uſe of; and drew it after them. Happily at length in neerly attending on one, that wrought a nett, I ſaw him ſuddainly in the mid-work to deſiſt, and turning his taile into the wind to dart out a thred with the violence and ſtreame, we ſee water ſpout out of a Spring: This thread taken up by the wind, was in a moment emitted

mitted ſome fathoms long, ſtill iſſuing out of the belly of the animal; by and by the Spider lept into the air, and the thread mounted her up ſwiftly.

After this firſt diſcovery, I made the like Obſervation in almoſt all the ſorts of Spiders, I had before diſtinguiſhed; and I found the Air filled with young and old ſailing on their threads, and undoubtedly ſeizing Gnats and other Inſects in their paſſage; there being often as manifeſt ſignes of ſlaughter, as leggs, wings of Flyes *&c.* on theſe threads, as in their webbs below.

One thing yet was a wonder to me, *viz.* That many of theſe threads, that came down out of the Air, were not ſingle, but ſnarled and with complicable wco'ly locks, now more now leſs; and that on theſe I did not always find ſpiders, though many times I had found two or three upon one of them: whereas when they firſt flew up, the thread was ſtill ſingle, or but little tangled, or, it may be, thicker in one place then another. In the end, by good attention I plainly found, what ſatisfied me abundantly, and that was this; That I obſerved them to get to the top of a ſtalk or bough, or ſome ſuch like thing, where they exerciſe this darting of threads into the air, and if they had not a mind to ſaile, they either ſwiftly drew it up again, winding it up with their fore-feet over there head into a lock, or break it off ſhort, and let the air carry it away. This they will doe many times together, and you may ſee of them, that have chains of theſe locks or ſnarled thread before them, and yet not taken flight.

Again, I found, that after the firſt flight, all the time of their ſailing they make locks, ſtill darting forth freſh ſupplies of thred to ſport and ſaile by.

It is further to be noted, that theſe complicated threads are much more tender, than our houſe-webbs.

In Winter and at Chriſtmas I have obſerved them buſy a darting, but few of them ſaile then, and therefore but ſingle threds only are to be ſeen; And beſides, they are but the young ones of laſt Autumns hatch, that are then employed; and it is more than probable, that the great ropes of Autumne are made only by the great ones, and upon long paſſages and Summer weather, when great numbers of prey may invite them to ſtay longer up.

But I ceaſe to be tedious: I have many Experiments by me to ſatisfy many doubts, that may be made, *viz.* of the infinite number of theſe Inſects, and their numberleſs Increaſe; and beſides, how ſtrangely they are able to furniſh and huſband great quantities of matter out of ſo ſmall a bulk *&c.*

You may expect all from me after another ſummers leiſure, which at leaſt I think neceſſary to confirm to me theſe; and other things concerning their *Generation* and *Poiſon.* What I have ſaid at preſent, is ſuch as I haue certainly obſerved; and you may take the Truth of theſe Obſervations for excuſe of the ill Texture of them.

An Accompt of ſome Books.

I. *GEORGII SINCLARI ARS NOVA & MAGNA GRAVITATIS et LEVITATIS. Roterodami in 4° A. 1669.*

THe Argument of this Book is the *Spring* and *Preſſure of the Air*, together with ſome Conſiderations touching the *Weight* and *preſſure* of *Water*, as alſo concerning a *Vacuum*, the effects of *Pumps*; item *Pendulums*, *Hygroſcopes &c.*

Whether the Doctrine or Experiments, here deliver'd, be *new* and *unheard* of (as the Author is pleaſed to think, they for the moſt part are) we leave to the well-read and Intelligent to Judge. Only we find our ſelves obliged to take notice that that excellent Treatiſe of the Honorable *Robert Boyle*, entitled, *New Experiments Phyſico-Mechanicall*, touching the *Spring of the Air* and its *Effects*, was printed *two* years before that time, about which the Author of this Book ſaith, in his *Preface to the Reader*; he came to *London*, and there committed his then un-printed papers to the Cenſure of the Philoſophical Colledg there, meaning the *Royall Society*, of whom he complains in the ſaid *Preface*, pag. 2. that he expected an Anſwer from them for almoſt two years in vain; adding, that he afterwards found, in divers Books printed in *Engliſh*, many things taken out of his Manuſcript.

But to undeceive the Reader in this particular, we ſhall *firſt* deſire him, to compare the *date* of the Edition of Mr *Boyles* Book above-mentioned with that of the Time of this Authors viſiting *London*, and there expoſing his *Manuſcript*; that done, it will eaſily appeare, which party hath the priority in the Explication of this Doctrine touching the Air: where it muſt not be left un-mentioned, that Mr *Sinclair*, when he was in *London*, in his viſits of Mr. *Boyle* diſcourſed much with him on that ſubject, and by his own acknowledgment, then made to that Gentleman, recieved much light from him concerning the ſame. *Secondly*, we ſhall take notice, that 'tis ſo great a miſtake, that this Author commended his Manuſcript to the Judgment of the R. *Society*, that 'tis not ſo much as mention'd any

where

where in their Regiſter-book, that ſuch papers came ever before them (which yet is their conſtant and careful practice to doe of all things of that nature;) to which we muſt adde, that the perſon with whom he left thoſe Papers of his, Sir *Robert Moray* (perhaps with a deſire to recommend them to that Illuſtrious Body) affirms, that he did not at all judg them proper to be exhibited there, becauſe they ſeem'd to him to containe nothing new or extraordinary.

II. *OBSERVATIONES MEDICÆ*, Mich. Leyſeri, Henr. a Moinichen, Mart. Bogdani, Jac. Seidelii, *è Muſæo* Th. Bartolini *Hafniæ in* 8°.

THough theſe Obſervations have been abroad theſe ſeveral years, yet coming but lately to our view, we could take no ſooner notice of them. Divers are not inconſiderable; e. g. Of a Pleuriſy, ending in an Abſceſs in the Thigh: Of an Abſceſs in the Thigh evacuated by Vrine: Of a great clew of wormes voided by crude Mercury taken inwardly: Of a Pleuriſy cured without Blood-letting: Of the Bones of a *fœtus* drawn out of the Mothers belly, ſhe ſurviving and bearing ſeveral children afterwards: Of the opening of an *Vterus* cloſed from the birth: Of a bigg Stone found in the Emulgent veins of a Boy of 9. years old: of a Pin ſwallow'd and breaking out of the Thigh 4. years after: Of a Noſe cut off by the hand of Juſtice, and happily ſet and healed on again, by receiving it, when it fell off, into a warm loaf of bread cut in the middle, and ſo ſowing it on: Of a Hen, bringing forth 5 well-formed and live chickins immediately out of her belly, which kill'd her: Of an odd heat in the extreameſt parts of the body, whilſt the intermediat ones betwixt them and the heart were very cold: Of a Quartan cured by drinking very new Beer, and ſweating largely upon it: Of an Eye taken out of the Head of a living man, which being examin'd had all its humors converted into a tallowy matter: Of ſtrange Convulſion-fits, accompanied with vomitings of odd matter, happily cured: Of an unuſual caſe of Melancholy, in which the Patient abhorred moſt kinds of meat, drink, veſſels, and almoſt all people, fancying them to have toucht or been toucht by Epileptical perſons: Of a Stone generated in the Tongue: *&c.*

Having inquired of an obſerving Correſpondent, living in the Country, Whether he had met with any ſuch Inſtances as was mentioned above, of a *Viviparous* Hen, he returned this Anſwer, that at *Wackton* in *Norfolk*, 2. or 3. years ſince, there was a Hen, which bigg with Eggs, upon ſome account could not lay, but after a time dyed; and then being opened, there was found in the *Ovarium* a perfect chick, which was offered to a Phyſitian in thoſe parts to preſerve.

III. *OTTONIS TACHENII HIPPOCRATES CHYMICVS.* Venetiis *in* 12°.

AND this Author, though printed 2. or 3. years agoe, came not to our knowledge, till now: He in this Tract, endeavours to juſtify the Antients, blamed by *Zwelſer* in his *Pharmacophæa Auguſtana* for having committed ſeverall faults in the preparation of a certain *Salt* call'd *Theriacal* becauſe extracted out of Vipers and divers other Ingredients compoſing *Theriack.* And having done this, he thence takes occaſion to treat of the nature of *Salts*, eſpecially of the *Alcaly's* and *Acids*, which he, with ſome other Chymiſts, holds to be the firſt Principles of all mixt Bodies. And being perſwaded, that *Hippocrates* was alſo of this opinion, and a great Chymiſt too, he entitles this Book *Hippocrates Chymicus.*

Though the Salt *Alcaly* properly ſignifies that Salt which is drawn out of the Aſhes of an *Ægyptian* herb, named *Kaly*; yet Chymiſts take it in a larger ſenſe, and underſtand by that word all the Salts, which, like that of the ſaid herb, draw and impregnate themſelves with *Acid* ones. To this Salt our Author refers almoſt all the Operations of Nature, and having examined its proprieties, relates divers not Un-curious Obſervations concerning it.

For Example: That nothing pierces ſo much as *Alcaly's*, and that therefore Nature hath ſtored the Sweat of Animals ſo plentifully with it. For, that the ordure, which continually gathers on the skin, would ſoon ſtop the pores of it, if the ſweat were not furniſht with ſome efficacious diſſolvent to open and pierce them. Where he obſerves, that the beſt liquored Boots, and ſuch as are water-proof, will be quickly pierced by the ſweat of Horſes; adding, that though Riding Poſt he had, to avoid that inconvenience, rubbed his Boots with a Vernice, which reſiſted even to *Aqua fortis*, yet the ſweat of the Horſes, he rode on, diſſolved that fence after the ſecond day of his voyage.

Next, he holds it to be an error, to uſe *Spirit of Vitriol* for Whitening the Teeth, Experience ſhewing, that from the mixture of an *Alcaly* and the *Spirit of Vitriol* there reſults a yellow, and that there is an Alcaly continually tranſpiring out of the Gumms, as of all the other parts of the Body; whence it muſt follow, that the Spirit of Vitriol employed to rubb the Teeth, when mixt with that Salt, muſt tinge them of the ſame colour.

Then he affirms, that wood *rotten* hath no Alcaly in it, and that it rots not but upon the account of the exhaling of that Salt. Whence 'tis *ſaith he*, that the *Venetians*, to harden the Timber deſign'd for building of Ships, ſink it green in water, and there leave it many years; which is the cauſe, that the Alcaly having been hindred from exhaling, the Timber rots not, and becomes as hard in a manner as ſtone.

We cannot pretermit taking notice, that this Author finds occaſion in this Book to explain the way, ~~by which the~~ famous *Turnheiſſer*, a German Chymiſt, made that celebrated Nail, half Gold and half Iron, which is ſhew'd at *Florence*, in the Repoſitory of the Great Duke of *Tuſcany*. 'Tis ſaid, that that Chymiſt, having in the preſence of that Prince immerſed in a certain Oyle the one halfe of a Nail, which appear'd to be all Iron, that part, which touched the Oyle, was inſtantly found to be good Gold. Several perſons having examin'd this Nail, and ſeeing the Gold and Iron exceeding well conjoyned, were perſwaded, that that could not be effected, but by a true change of one of thoſe two metals into the other, believing it impoſſible, they could be ſoder'd together. But the Author of this Book maketh that a very eaſy thing, if the Iron be before prepared after a certain manner, which he teacheth; and he pretends, that that was the whole Secret of *Turnheiſſer*, the reſt being nothing but illuſion. For, after he had by that means ſodered together a piece of Gold with halfe a Naile, he knew ſo well to give the color of Iron to Gold, that men believed, that the whole Naile was of Iron; and having afterwards put this Naile into the fire, and held it in the Oyle to take off that colour, he made appear that Gold, which was hid before.

IV. *TH. BARTHOLINI Diſſertatio de CYGNI ANATOME, nunc aucta à CASP. BARTHOLINO F. Hafniæ in* 8°. *A.* 1668.

IN this Diſcourſe the Author chiefly obſerves the wonderfulneſs of the internall fabrick of this Stately Bird; and more eſpecially of the admirable ſtructure of its *Wind-pipe*; which is ſo framed, that together with the *Oeſophagus* or *Weaſand* it reaches down to the *Sternum*, into which, as a ſafe caſe, it winds it ſelf, and being gone down to the bottom of that cavity is turned up again, and gets out of the ſtreights of the *Sternum*, and climbing up the intermediate clavicles, on which it leans as on a baſe, it bends to the *thorax*. But before it comes to the *Thorax* and the *Lungs*, it forms a kind of *Larynx* with an *Os Hyoides*, covered with a large membrane, and reſembling a muſical pipe, wide above, but with a narrow ſlit, and ſtreight and depreſſed below. Under which *Larynx*, before the Wind-pipe enters into the Lungs, it is divaricated into two branches, like unto *bronchiæ* thicker in the middle, but narrower where they are near the Lungs: In which particular it differs from the human *Arteria aſpera*, which, 'tis true, is alſo divided into branches, but not before it be entred into the Lungs.

After this deſcription of the ſtructure of this Organ he conſiders the fitneſs of its contrivance for ſuch a Reſpiration, as was requiſite for an Animall, that by long diving and ſinking its neck to the bottom of waters was to find its food.

V. *ÆGIDII STRAUCHII BREVIARIUM CHRONOLOGICUM. Witebergæ in* 12°.

VI. *ABREGE CHRONOLOGIQUE DE L'HISTOIRE SACREE et PROPHANE, par le P.* Labbe *de la Comp. de Jeſus, Paris. in* 12. *in* 5. *Volumes.*

WE put theſe two Books together, becauſe of the likeneſs of their Argument; and we eſteem alſo, that both theſe may deſerve to be Joyned to and compared with, that of Mr. *Beverige*, of which an Accompt was given in the Tranſactions of *May* laſt.

The *former* of theſe two is divided into two parts, a *General* and a *Particular.*

The *General* conſiders Time in general, and its various denominations and Characters, and eſpecially explains that common Receptacle of all *Epocha's*, the *Iulian Period*, enlarging upon its Uſes and Advantages.

The *Particular* conſiders time in particular, demonſtrating the certainty of *Epocha's*, and enumerating the *Calendars* of the ſeveral Nations.

The *latter* Author, conſidering with himſelf, that of the writers of Chronology, ſome have contented themſelves to teach only the Precepts thereof; others, to reform the dates of it, and to marke the Characters of Times, without rehearſing the conſiderable paſſages of them ; others on the contrary confounding Chronology with Hiſtory , have recited the remarkable Events, without much troubling themſelves about the time , wherein they hapned ; this Author, I ſay, hath attempted to joyne them altogether in this Work. And,

Firſt , He gives an Introduction , in which he explains , what is the Indiction , the Cycle,the Epocha, and all the other terms of Chronology.

Secondly , Foraſmuch as the *Epocha's* , whence we begin to reckon the Years , are the foundations of Chronology , he treateth accuratelyof the Year of our *Saviours Nativity* and *Death* ; of the *Years* of the *Kings of France* of the firſt and ſecond Race, and of the other celebrated *Epocha's*.

Thirdly, He delivers in ſhort all the more remarkable paſſages of every Year ſince the Creation of the World till the Year *1666.* indicating the Authors , whence an ampler information may be taken. And to eſtabliſh certain principles of Chronology , he placeth at the beginning of all Years the Names of the Conſuls , Cycles , Indictions, Eclipſes, and all the other Characters , that diſtinguiſh the Years from one another. And he often does not content himſelf with marking the *Year* , in which the more notable things have hapned , but he adds alſo the *Month* and *Day* , eſpecially in the latter Ages ; which is a great relief upon many occaſions.

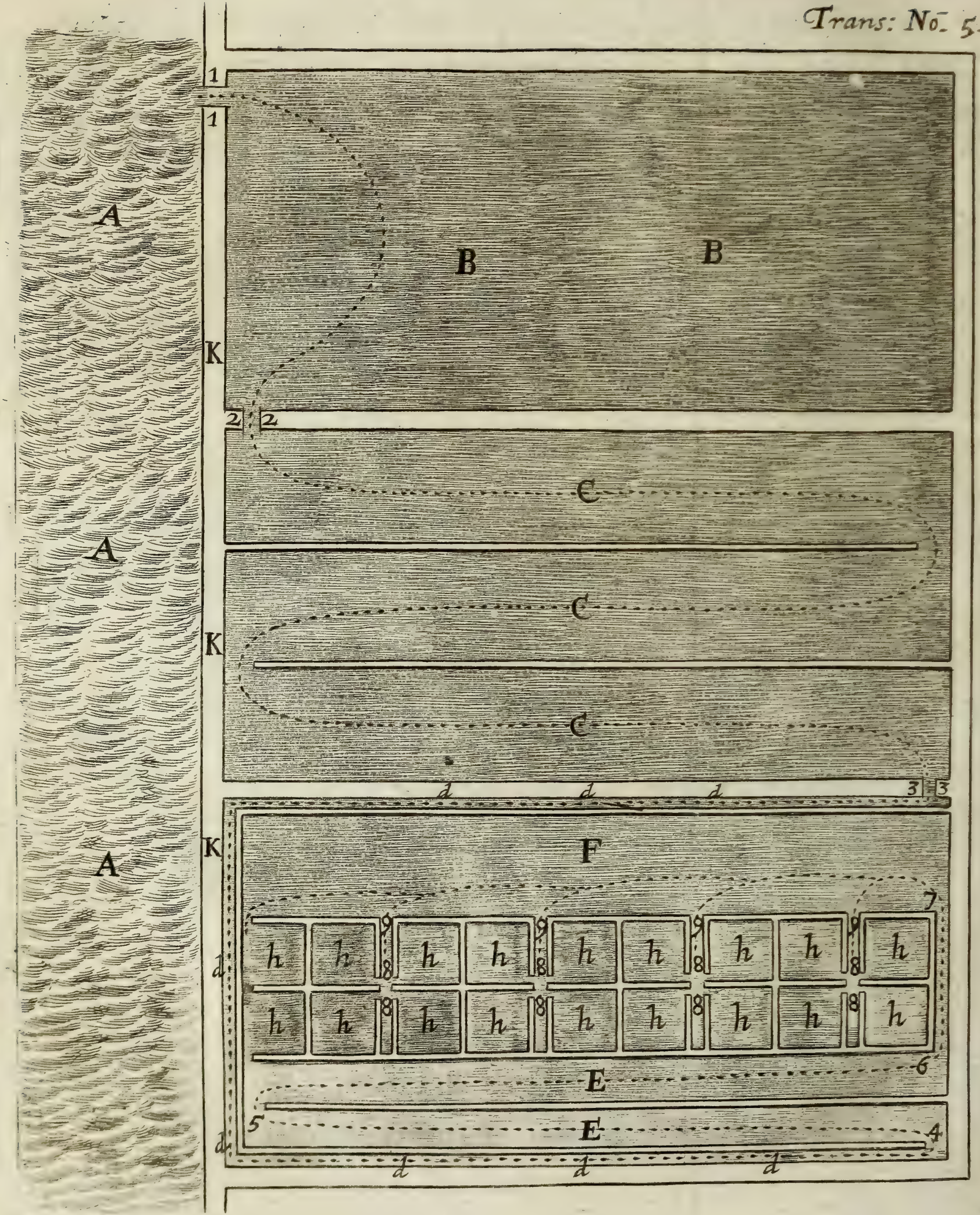
Fourthly, He hath a particular Diſcourſe, wherein he examineth, in what time *Dido* lived, and ſhews, that ſhe was dead before the Birth of *Æneas*, againſt the opinion of a modern Author; and conſequently that whatſoever *Virgil* hath ſaid of the Marriage of *that* Queen with *this* Prince, is fabulous

FINIS

Printed by T. N. for *John Martyn* Printer to the
Royall Society, and are to be ſold at the *Bell*
a little without *Temple-Bar*, 1669.

BRITISH MUSEUM
NATURAL HISTORY.

Trans: No. 51.



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PHILOSOPHICAL TRANSACTIONS.

September 20. 1669.

The Contents.

The Proceſs uſed in France *of making* Sea-ſalt *by the Sun. An Anſwer to ſome Inquiries about the late Eruption of* Mount Ætna. *An Account of two Books:* I. *DISCOURS de M. STENON ſur L'ANATOMIE du CERVEAU* II. *The former Accompt of Dr Witties ANSWER to HYDROLOGIA CHYMICA enlarged: Where the ſanative vertue of the* Scarborough Spaw *is aſſerted from long experience; and on that occaſion the Healing performances of many other Waters, both in England and elſewhere, diſcourſed of; together with their particular Cures, Ingredients, Mixtures, and the Wayes of Analyſing them; as alſo the Neceſſity of uſing them or moſt of them at the Spring-head, &c.*

An Extract of a Letter

Containing the whole Proceſs, uſed in France *for making* Sea-Salt *by the Sun; communicated to the Publiſher in French, by an Ingenious Dr of Phyſick of that Nation, reſiding near the chief place, where 'tis practiſed; and Engliſhed as follows:*

Sir,

I Can at preſent acquit myſelf but of one of the Commiſſions, you gave me when I took my leave of you, referring the other to more leiſure. And I herewith ſend you the Plan * of our Salt-making Mariſhes,

* *See the Figure.*

together with the *Way* of making our Salt. If there be any thing, I have forgot, or related obſcurely, give yourſelf only the trouble of advertizing me of it, and in my next I will add or cleer it.

AAA. is the Sea.

II. the Entry, by which the Sea-water paſſes into BB.

BB. the firſt Receptacle; in which the Water is kept 20. inches deep.

CCC. the ſecond Receptacle, where the Water maketh three turnings, as you ſee, and is 10. inches deep.

22. the Opening, by which the firſt and ſecond Receptacle have communication one with another.

EEF. the third Receptacle, which is properly called the Mariſh.

dddddd. is a Channel very narrow, through which the Water muſt paſſe before it enters out of the ſecond Receptacle into the third.

33. is the Opening, by which the Water runs out of the ſecond into the third Receptacle.

The pricks, you ſee in the Water throughout the whole *S*cheme, doe mark the courſe and turnings, which the Water is forced to make before it comes to ***hhhhh***, which are the places where the *S*alt is made.

hhhhh. are the Beds of the Mariſh, where the *S*alt is made; and in them the Water muſt not be above an inch and an half deep. Each of theſe Beds is 15 foot long and 14 foot large.

99999. are the little Channels between the Beds.

88888. are the Apertures, by which the Beds receive the *S*ea-water after many windings and turnings.

When it raines, the openings 22, 33. are ſtopp'd, to hinder the Water from running into the Mariſh mark't E E F. Unleſs it rain much, the rain-water doth little hurt to the Mariſh; and although it rain a day or a night, we doe not let the water which is in the Mariſh run out, the heat of the *S*un ſufficiently exhaling ſuch Rain-water, if, for example it be not above an inch high. Only, if it have rain'd very plentifully that day, no *S*alt is drawn for the 3. or 4. next-following days. But if it rain 5. or 6. days, the people are then neceſſitated to empty all the Water of the Beds by a peculiar Channel, conveighing it into the Sea; which Channel cannot be opened, but when 'tis Low water. But 'tis very ſeldome, that it rains ſo long as to conſtraine men to empty thoſe Beds.

'Tis obvious, that the hotteſt years make the moſt Salt; where yet it is to be noted, that beſides the heat of the Sun, the Winds contribute much to it, in regard that leſs Salt is made in Calme, than in Windy weather. The Weſt-and North-weſt Winds are the beſt for this purpoſe.

Our Country-people draw the Salt every other day, and they draw out of thoſe Beds, mark't *hhh*, every time more than an hundred pound weight of Salt.

In the hotteſt part of the Summer there is Salt made even during Night.

The Inſtruments uſed to draw the Salt, have many ſmall holes, to let the Water paſs, and to retain nothing but the Salt.

According to the *Quality* of the Earth or Ground of the Mariſh, the Salt is made more or leſs White. The Reddiſh earth maketh the Salt more Gray; the Blewiſh, more White: Beſides, if you let run in a little more water than you ought, the Salt becoms thence more White; but then it yields not ſo much. Generally all the Mariſhes require a fat Earth, neither Spongy nor Sandy.

And as to the Whiteneſs of Salt in particular, there are 3. things to be conſidered: *Firſt*, that the Earth of the Mariſh be proper. *Secondly*, that the Salt be made with good ſtore of water. *Thirdly*, That the Salt-man, who draws it, be dextrous. In this Iſle of *Rhe* there are, that draw very dark Salt, and others, that draw it as white as Snow; and ſo it is in *Xaintonge*. Chiefly care is to be taken, that the Earth at the bottome of the Beds mingle not with the Salt. The Salt, we uſe at our Tables, is perfectly white; which is thence, that 4. or 5. hours before the Salt is to be drawn, we draw the Creme, or that Salt which is form'd on the top of the water. The grains of it are ſmaller, than of the other. Generally the Salt of *Xaintonge* is ſomewhat whiter, than ours. I do not well know the bigneſs of the *S*ea-*S*alt made by Fire; but ours is of the ſize of a Pepper-grain, and of a Cubical ſhape.

The Mariſhes are preſerv'd from one year to another by overflowing them, ſo that the water be near a foot high above the Mariſhes.

There are Mariſhes, that are not ſeparated from the *S*ea but by a ditch of 20. or 30. foot large: others are further diſtant, receiving the Water by Channels, that are made according to the *S*cituation of the Mariſhes. To preſerve this Ditch, it is ſtrengthened with ſtones from the foot to the top, as we uſe to pave ſtreets.

The Timber of the Mariſhes, if it be of good Oak, keeps near thirty years; but there is uſed but little Wood, all the Ditches and Apertures being done with ſtones.

An Anſwer
To ſome Inquiries concerning the Eruptions of Mount Ætna, *An.* 1669. *Communicated by ſome Inquiſitive Engliſh Merchants, now reſiding in* Sicily.

Touching the Forerunners of this Fire, there was, for the ſpace of 18. days, before it broke out, a very thick dark sky in thoſe parts, with Thunder and lightning and frequent Concuſſions of the Earth, which the people make terrible reports of, though I never ſaw nor heard of any Buildings caſt down thereby, ſave a ſmal town or village, call'd *Nicoloſi*; about halfe a mile diſtant from the New Mouth, and ſome ſuch other ſlight Buildings among thoſe Towns, that were after over-run by the Fire. Beſides, it was obſerv'd that the Old top or Mouth of *Ætna* did, for 2. or 3. months before, rage more than uſual; the like of which did *Volcan* and *Strombilo*, two Burning Iſlands to the Weſt-ward. And the top of *Ætna* muſt about the ſame time have ſunk down into its old *Vorago* or hole, in that 'tis agreed by all, that had ſeen this mountain before, that it was very much lower'd. Other Forerunners of this Fire I have not heard nor met with.

It firſt broke out on the Eleventh of *March* 669. about two hours before night, and that on the *South-Eaſt-ſide* or skirt of the Mountain, about 20. miles beneath the Old Mouth; and 10. miles from *Catania.* At firſt it was reported to advance 3. miles in 24. hours; but at our being there (*viz. April* 5) when we were come within a ſhort mile of *Catania*, it ſcarce mov'd after the rate of a furlong a day; and after this degree of progreſs it continued for 15. or 20. days after, paſſing under the walls of *Catania* a good way into the *Sea*; but about the latter end of this Month and the beginning of *May* (whether it was that the *Sea* could not receive this matter faſt enough, or rather that the Mouth above did caſt forth a larger quantity) it bent all its force againſt the City; and having wrought itſelf up even with the Wals thereof, over it paſs'd in divers places; but its chief fury fell upon a very ſtately *Convent*, which was that of the *Benedictins*, having large Gardens and other ground betwixt them and the Wall: Which when it had filled up, it fell with all its force on the Convent, where it met with ſtrong reſiſtance, which made it ſwell (as uſually it did, where it met with any Obſtruction) almoſt as high, as the higher Shops in the Old London Exchange, this Convent being built much after that faſhion, though conſiderably bigger. *S*ome parts of this Wall were driven in, whole and entire, almoſt a foot, as appeared by the riſing of the tyles in the midſt of the floor, and bending of the Iron-barrs that went croſs above. And 'tis certain, had this Torrent fallen in ſome other part of the Town, it would have made great havock amongſt their ordinary Buildings, but here its fury ceaſed the 4. of *May*, running hence forward in little channels or ſtreams, and that chiefly into the Sea. It had overwhelmed in the upland-contry ſome 14. Towns and villages, whereof ſome were of good note, containing 3 or 4 thouſand Inhabitants, and ſtood in a very fruitful and pleaſant Country, where the Fire had never made any devaſtation before: but now there is not ſo much as any ſign, where ſuch Towns have ſtood; only the Church and *S*teeple of one of them; which ſtood alone upon an high ground, does ſtill appeare.

As to the matter, which thus ran, it was nothing elſe, but divers kinds of Metals and Minerals, rendred liquid by the fierceneſs of the Fire in the bowels of the Earth, boyling up and guſhing forth, like the water doth at the head of ſome great

River; and having run in a full body for a good *S*tones caſt or more, the extreamities thereof began to cruſt and curdle, becoming, when cold, thoſe hard porous *S*tones, which the people call *Sciarri*, having the neareſt reſemblance to huge Cakes of ſea-cole; full of a fierce Fire. Theſe came roling and tumbling over one another, and where they met with a bank, would fill up and ſwell over, by their weight bearing down any common building, and burning up what was combuſtible. The chief motion of this matter was forward, but it was alſo dilating it ſelf, as a Floud of Water would doe on even ground, thruſting out ſeverall Armes, or Tongues, as they call them.

About 2. or 3. of the Clock in the night we mounted an high Tower in *Catania*, whence we had a full view of the Mouth; which was a terrible ſight, *viz.* to ſee ſo great a maſs or body of meer Fire. Next morning we would have gone up to the Mouth itſelf, but durſt not come nearer than a furlong off, for feare of being overwhelmed by a ſudden turn of the wind, which carried up into the Air ſome of that vaſt pillar of Aſhes, which to our apprehenſion exceeded twice the bigneſs of *Pauls S*teeple in *London*, and went up in a ſtreight body to a farr greater hight than that; the whole Air being thereabout all cover'd with the lighteſt of thoſe Aſhes blown off from the top of this pillar: And from the firſt breaking forth of the Fire untill its fury ceaſed (being 54. days) neither *S*un nor *S*tarr were ſeen in all that part.

From the outſide of this pillar fell off great quantity of *S*tones, but none very bigg, neither cou'd we diſcern any Fire in them, nor come to ſee, where that fiery ſtuff broke out, there being a great bank or hill of Aſhes betwixt it and us.

At the Mouth, whence iſſued the Fire, or Aſhes, or both, was a continual noiſe, like the beating of great waves of the *S*ea againſt Rocks, or like thunder a farr off, which ſometimes I have heard here in *Meſſina*, though ſituated at the foot of high hils and 60. miles off. It hath alſo been heard 100. miles Nordward of this place, in *Calabria* (as I have been credibly informed,) whither the Aſhes have alſo been carried: And ſome of our ſeamen have alſo reported, that their decks were covered therewith at *Zant*, though its likely not very thick.

Of thoſe Burnt Stones or *Sciarri*, I have ſome by me of divers qualities, and ſhall procure what more I can, to be ſent by the firſt paſſage.

About the middle of *May* we made another Journey thither, where we found the face of things much altered, the City of *Catania* being three quarters of it compaſſed round with theſe *Sciarri*, as high as the top of the Wals; and in many places it had broke over. The firſt night of our arrival a new ſtreame or gutter of Fire broke forth among ſome *Sciarri*, which we were walking upon an hour or two before, and they were as high as to be even with the top of the Wall. It powred itſelf down into the Citty in a ſmall gutter of about 3. foot broad, and 9. foot long of meer Fire, the extremities ſtill falling off into thoſe *Sciarri*; but this ſtreame was extinct by the next morning, though it had filled up a great void place with its *Sciarri*. The next night was another much bigger Channel diſcovered, powring itſelf over another part of the Wall into the Caſtle-ditch, which continued (as we were informed) ſome days after our departure. Divers of thoſe ſmal Rivolets did run at the ſame time into the *Sea*, and it does ſo ſtill at this very day, though faintly.

It was obſerved, that thoſe ſtreams of Fire never grew broader nor viſibly longer, nor moved out of the place, they were ſeen in; which put us a little more to examine their working, and we did conclude, that not only then, but in the fury alſo of its running, it made it ſelf certain cruſted gutters to run in, to keep itſelf, as 'twere from the Air, which by degrees did cool and fix it, as more plainly appear'd above at the Mouth, where, the firſt time of our going thither, we found the *Sciarri* generally thus coold and fixt. And hence alſo it might proceed, that theſe live *Sciarri*, meeting with any bank or high ground, would puff and ſwell up, till they had overcome it; ſo that in many places, eſpecially under the Wals of *Catania*, were Vallys of thoſe *Sciarri*, and the Fire never broke forth, or diſcovered itſelf in thoſe ſtreams, until it had gain'd its hight; for thoſe rivolets ever went declining.

Having ſpent a couple of days about *Catania*, we again went up to the Mouth, where now without any danger of Fire or Aſhes we could take a a free view both of the old and new Channel of the Fire,and of that great mountain of Aſhes caſt up. That,which we gueſſed to be the old bed or channel, was a three corner'd plot of about 2. Acres, with a cruſt of *Sciarri* at the bottom, and upon that a ſmal cruſt or ſurface of Brimſtone. It was hedg'd in on each ſide with a great bank or hill of Aſhes, and behind and at the upper end roſe up that huge mountain of the ſame matter. Between thoſe two banks the Fire ſeems to have had its paſſage. At the upper end in the nook upon a little hillock of cruſted *Sciarri* was an hole about 10. foot wide, whence 'tis probable the Fire iſſued; and it might have had ſeveral other ſuch holes, ſince either cruſted over or covered with aſhes. At the bottom of this hole the Fire was ſeen to flow along, and below it was a channel of fire, beneath that ſurface of *Sciarri*, which being cleft a top for ſome ſpace, we had an eaſy and leiſurable view of the metal flowing along, whoſe ſuperficies might be a yard broad, though poſſibly it carried a greater breadth underneath, the gutter going ſloping. What depth it had,we could not gueſs: it was impenetrable by Iron hooks and other Inſtruments we had. We were very deſirous to have got ſome of this matter at the Spring head, but we could penetrate no more into it, then with ones finger into the palme of the hand. 'Tis likely, that ſome running may have been more yielding, than we found this. From this channel,but eſpecially from that hole above it, iſſued great ſtore of a ſtrong ſulfureous ſmoak, wherewith ſome of our company were at firſt almoſt ſtifled through inadvertency. About once in a quarter of an hour there would riſe a pillar of ſmoak or aſhes, but nothing comparable to the former; which ſeem'd to come from the middle top of that new made Mountain. I confeſs, it was an omiſſion in us, not to goe up to this mountain, being ſo near; but becauſe it was troubleſome and not without danger, the reſt of the company being ſatisfied with what they had already ſeen,would not ſtay to ſee any more.

At this our laſt being at *Catania* we found the people buſy in barricading the ends of ſome ſtreets and paſſages, where they thought the fire might break in; and this they did by pulling down the old houſes thereabout, and laying up the looſe ſtones in manner of a wall, which they ſaid would reſiſt the fire as not being mixt with lime; though it was the great weight and force of that fiery matter in preſſing forward, and not its burning, that overthrew the buildings, as plainly appeared in the Convent of the *Benedictins*, and in the Town-wals, where the great deluge of Fire did pour it ſelf; it not breaking into the City, but pouring it ſelf over the wals, as hath been ſaid.

Unto this very time 'tis ſaid to have run a mile into the Sea, and as much in front, though it was much leſs, when we were there. The ſhore goes gently declining, having at the extremity of the *Sciarri* about 5. fathoms, and about half as much they are above water.

The ſuperficies of the water, for 20. foot or more of thoſe rivolets of fire, was hotter than to endure on's hand in it, though deeper it was more temperate, and thoſe live *Sciarri* ſtill retain'd their fire under water, as we ſaw, when the Surges of the Sea retreated back in their ordinary reverberations.

The general face of theſe *Sciarri* is in ſome reſpect not much unlike, from the beginning to the end, to the river of *Thames* in a great froſt at the top of the Jce above bridg; I mean, lying after ſuch a rugg'd manner in great flakes: but its color is quite different, being moſt of a dark dusky blew, and ſome ſtones or rocks of a vaſt bigneſs, cloſe and ſolid.

But notwithſtanding their ruggedneſs, and ſtore of fire, which we could ſee glowing in the clefts and cavaties, we made a ſhift to ramble over a good part of them; as 'tis ſaid alſo, that people would doe the ſame in its greateſt violence of burning. For as thoſe live *Sciarri*, and thoſe Rivers of fire themſelves were ſo tough and impenetrable as to bear any weight, ſo the ſuperficies of the *Sciarri* might be toucht and handled, the fire being inward, and not to be diſcerned but near hand, eſpecicially in the day time: And 'twas ſomewhat a ſtrange ſight to ſee ſo great a River come ſo tamely forward; for, as it approached unto any houſe, they not only at good leiſure removed their goods, but the very tiles, and beams, and what elſe was moveable.

'Tis obſervable, that none of thoſe, that went to ſee it, when there was little elſe to be ſeen but the cold *Sciari*, but declared to have found it a much other thing, than they imagined, though related to them *viva voce* by thoſe who had formerly been there.

I ſhall add, that the whole country from the very Walls of *Catania* to 20. miles on this ſide is full of thoſe old *Sciarri,* which former Eruptions have caſt forth, though the people remember none ſo bigg as this laſt, or that burſt out ſo low. This Country is notwithſtanding well cultivated and inhabited; for length of time hath either mollified much of thoſe old *Sciarri*, or new mould or aſhes have overgrown them; though there ſtill remains much Country, which, it may be, will never be made ſerviceable.

What is the perpendicular hight of this Mountain, I cannot learn. It cannot perhaps be rightly taken, being ſo ſubject to alter its height and ſhape. But it is a very goodly Mountain to look upon, as one paſſes by *Sea* to the Eaſt-ward, ſtanding alone by it ſelf, riſing from the very ſhore; and at ſhorteſt paſſage is reckoned 20. miles up to the top, though from *Catania* it hath 30. miles, as before.

An account of two Books

I. *DISCOURS de M. STENON ſur L' ANATOMIE du CERVEAU. A* Paris 1669. *in* 12.

IN the beginning of this Diſcourſe the Author repreſents, that thoſe, who ſearch after ſolid knowledge, will find nothing ſatisfactory in all that hath been hitherto written concerning the *Brain*: that all, which Anatomiſts agree in, is only, that it conſiſts of two Subſtances, a White and a Grayiſh, and that the *former* is continued with the Nerves, that are diſtributed through the whole Body; and the *latter* ſerves in ſome places for a kind of *Cortex* to the *White,* and in others, ſevers the white filaments from one another. But that they are yet ignorant, what thoſe ſubſtances are; in what manner the Nerves are Joyned in the *White*; and how farr their extreamities advance in it; from which diſpoſition yet depends all the diverſity and variety of our ſenſations and motions. And as for the *Ventricles* or Cavities of the Brain, he affirmes them to be no leſs unknown, than its Subſtance; ſome Anatomiſts lodging

ing in them the Spirits, others making them the receptacles of the Excrements of the Brain; and both perplext in aſſigning the ſource and Iſſue of the Excrements, and the Spirits, and the manner of the production of the latter.

Beſides this, he finds a great defect in the way of diſſecting the Brain, and having ſhewed the imperfection in the common ways, he propoſes and recommends that (though difficult one) of continuing the filaments or threds of the Nerves through the Subſtance of the Brain, to ſee, where they paſs, and where they terminate.

Next, he entertains the Reader with an Enumeration of the chief *Errors* of Anatomiſts touching the brain. And here he examins particularly the Syſtemes of Dr. *Willis* and Monſieur *Des-Cartes*. In the *former* he takes ſpecial notice, that the Author thereof lodges the *Common Senſe* in the *corpus Striatum*; the *Imagination* in the *Corpus Calloſum*; and the *Memory* in the *Grayiſh Subſtance* which encompaſſes the *White*. But then he declares, that theſe aſſertions are very obnoxious; for, whereas Dr. *Willis* deſcribes that *Corpus ſtriatum*, as if there mere two ſorts of Streaks or Rays, ſome aſcending, ſome deſcending, he finds, that a ſeparation being made of the *Gray* body from the *White*, thoſe Rays will be found to be all of the ſame nature, that is, they make part of the *White* ſubſtance of the *Corpus Calloſum* which paſſes towards the Marrow of the Back, ſeparated in divers Layers by the intervening of the *Grayiſh* Subſtance. Which being ſo, *ſaith he*, with what certainty can we be made to believe, that thoſe three Operations are performed in thoſe three Bodies? And who can tell us, whether the nervous Fibres have their beginning in the *Streaked Body*, or whether they rather paſs through the *Callous Body* into the *Gray Subſtance*?

In the *latter* of M. *Des Cartes*, he finds, that that Philoſopher hath rather *deviſed*, in his *Treatiſe of Man*, ſuch an Engine, that performs all the actions, Men are capable of, than deſcribed Man, as *really* he is; which he undertaketh to prove by divers inſtances, taken from the *Carteſian* fabrick of the parts of the Brain: in the doing of which our Author ſhowes great dexterity, skill, and accurateneſs. And from hence he proceeds, To obſerve the want of exactneſs in the Cutts or *Figures*, hitherto given of the Brain: and although he acknowledgeth, that the beſt Figures, hitherto made of that part, are thoſe of Dr. *Willis*, yet he finds ſeveral faults committed here and there, and conceives, there are many things to be added for making them perfect: which certainly this able Anatomiſt will conſider further, and according to his Ingenuity, as he ſhall ſee cauſe, rectify, if the Author of the Book, reflected on, prevent him not.

Having thus diſcuſſed the hitherto practiſed way of diſſecting the Brain, and the litle light to be derived thence, together with the defectiveneſs of the Figures belonging thereto, he leaveth it to the Conſideration of Judicious men, what faith is to be given to the Explications made upon ſuch unſolid foundations; and that done, he declares, which are the two only ways for attaining the true knowledge of an Engine; *viz. One*, by having the contrivance of it diſcovered by the Author himſelf; the *other*, by taking it in pieces to the very leaſt parts, and examining them all both ſeverally and joyntly. The former not being to be expected, he excites the Lovers of real knowledge to the careful performance of the latter; excuſing in the mean time thoſe two ſorts of perſons, that hitherto have addicted themſelves to Anatomical reſearches, *viz. Phyſitians* and *Chirurgions*, for not having made ſatisfactory diſcoveries by their labors, and alleadging on their behalf their want of time requiſite for this purpoſe; the ill conſequence of which he repreſents to be, that they often undertake to cure a Body, of which they know not the Structure, which is no better, (ſaith he) then if a man would repair or wind up an Engin, the parts of which he is ignorant of. And as for Profeſſors of Univerſities or other Schools, he Judges them not ſo proper for that particular application, and the variety of methods of diſſecting; both which is neceſſary for examining every the ſmalleſt part, and the obſerveables thereof; there being ſometimes required whole years for finding out one onely thing, that perhaps may afterwards be demonſtrated to others in one hour; which he exemplifyes by divers inſtances of Diſcoveries, made by ſome of the modern Anatomiſts.

He concludes his Diſcourſe by recommending the method which ſeems beſt and moſt convincing to him, for making true Diſcoveries in Anatomy; where he adviſeth, that for obtaining the true hiſtory of the parts, we ſhould examine and accordingly draw them in that *State*, in which they are found naturally, without at all forcing them; thereby to find, whether the parts are indeed joyned together or ſeparated, and what ſituation is aſſigned them by Nature it ſelf. Where he deſires, that the Anatomiſt would not only be intent upon the part, on which he is for the preſent employed, but alſo reflect upon all the Operations, he hath made before he came to that part, which may have cauſed ſome change or other in the ſame, as to its ſcituation, connexion *&c.* Of which he alſo alledges divers Examples, eſpecialy as to the Brain.

Beſides this exact attention on all the Operations, he further counſels the Change of the *ways* of Diſſecting, and deduceth the ill conſequences of binding our ſelves to certain fixt Laws of diſſecting each part; this benefit reſulting from that Change, that if it doth not always diſcover ſomething new, it lets us know at leaſt, whether we have been deceived in what we have ſeen formerly, eſpecially in things dubious and conteſted. Of the neceſſity of this Change he brings manifeſt proofs; and having done ſo, he alledges the reaſon why he ſays nothing of the *Uſe* of the parts of the Brain, nor of the actions called *Animal*; it being impoſſible to explain the motions, that are made by an Engin, if the artifice of the parts be not known, and thoſe Anatomiſts rendring themſelves ridiculous, that diſcourſe ſo magiſterially of the Uſe of the parts, of which they know not the ſtructure.

Laſt of all, he obſerves, that when all this, he hath diſcourſed of, *is* done, that is but the leaſt of what is *to be* done; in regard that for the acquiring of ſome good Knowledge of the Brain, there muſt be Diſſections and Examinations made of as many Heads, as there are different ſpecies's of Animals, and different *States* and Conditions of each kind; ſince that in the *fetus*'s of Animals it will be ſeen, How the Brain is formed; and what could not be ſeen in ſound and entire *Brains*, may be ſeen in ſuch, as have been changed by ſickneſs.

II. Inſtead of the *other* Book, of which we purpoſed to give here an Accompt, we find our ſelves oblieged ſomewhat to enlarge that which was, for want of more leiſure, too curſorily given in *Numb.* 49. of Dr, Witties *Anſwer to Hydrologia Chymica*, concerning the *Scarbrow Spaw.* To do therefore right to this Worthy perſon, we ought among other things to take notice of what he ſaith in his Preface; *That when he firſt publiſhed his Book, he had found the* Scarbrough Spaw, *even in* 20. *years Experience, to be eminently ſucceſful in the Cure of very many diſeaſes, which had reſiſted all rational Methods, that had been uſed either by himſelf, or others of his Faculty. That now his Practice had been near* 30. *years, and that now he can add ſome conſiderable Cures, which he hath not hitherto expreſſed.*

Now to ſollicit this Learned Doctor and others for theit farther Diſcovery's of Sanative Waters, and to add weight to the Argument; we may obſerve, that A. 1634. Dr. *Thobias Whitaker*, a famous Phyſitian of *Norwich*, Publiſhed in Engliſh a diſcourſe Περὶ Ὑδροποσίας, or Of *Drinking Mineral* Waters; particularly reflecting upon a Mineral Water then diſcovered in *Norfolk*, and producing the Joynt-advice of all Antiquity (as he pretends,) at leaſt of the beſt Writers, namely of *Hippocrates*, *Galen*, *Avicenna &c.* generally againſt all uſe of Mineral Waters either to be taken inwardly, or for any outward application. This *Diſcourſe* is recmmended by the expreſs approbation and elogies of *Dr William Clement*, Fellow and Regiſter of the Colledge of Phyſitians in London, and by *Dr. Alex. Read* Fellow of the ſame Colledge.

This may give fit Caution againſt the raſh Uſe of ſuch Waters, when ordinary Medicins may be effectual; and to take the advice of skilful Phyſitians in the Uſe of them. And for the Poor, which are not able to retain Phyſitians, nor to pay Apothecaries; they muſt abide the adventure of repairing to thoſe kind Fountains, which doe not unfrequently cure, when all other coſtly and tedious Methods doe faile. And *here* they may find the Suffrage of many Curious and Inquiſitive Authors, and the evidence of much Experience: *Here* they may ſee the real and great performances of Cures, and what are the particular Cures, what the particular Ingredients, and what the mixtures, together with the ſeveral ways of Analyſing the Waters *&c.*

As to the Sanative Properties in *general* of many Minerall Fountains (beſides the numerous Experiments of all ſorts of people for many Ages in ſome places, and of late diſcovery in other places) *Dr. Wittie* recites the Judicious teſtimony of *Dr. French* and *Dr Dean* concerning the *Knarſborough Spaw*; Doctor *Jordan* concerning the *Baths* in Somerſetſhire; *Dr. Heer's Spadocrene*; Doctor *Frambeſarius* and *Dr. Ryetius* of the *Sauvenir* in Germany, *Dr. Fallopius de Therm. Aquis* and the Spaws in Germany and Rome, de *Balneo Aponitano*, and the water at *Corſena*: Of ſuch waters in general, *Paracelſus* and *Helmont*: And this Doctors own deſcription of St. *Mungo's Well* at *Cockgrave.* To which we may now add *Aſtrap*-well in Northampton, lately diſcovered, together with that at *Stall-bridge* in Somerſetſhire, which laſt begins alſo to be in high eſteem for extraordinary Cures of the *Scorbute*, *Aſthma &c* which, beſides common fame, is (as we were freſhly informed by a worthy friend) atteſted by *Dr. Highmore*, who affirmes alſo upon his own Tryal, that it hath a larger proportion of the Minerals, than *Aſtrap*-water; but that the force holds not, if removed from the Spring-head. And Dr. *Wittie* hath himſelf ſufficiently aſſerted the Vertues of the *Scarborough-Spaw*; and particularly, that it cured the *Aſthma*, *Inveterate Catharrs*, *Hecticks*, *Conſumptions*, *Scurvy*, *Dropſy*, and other diſeaſes, when they ſeemed incurable: That an Alderman of *Hull* (to whom himſelf, and the famous Dr. *Primroſe*, were, 15. years agoe, joyntly Phyſitians for the *Aſthma*) had in few days perfect cure by the Spaw, and is yet living to vouch the teſtimony: So that all the neighbourhood are taught by frequent experience to ſing the old Song of *Claudian*, which he made for his *Aponus*:

Publica morborum requies, commune medentum
Auxilium, præſens Numen, inempta Salus.

And this old Record may put us in mind, that lofty Groves and healing Fountains have been reputed Holy in old times; and we can ſhow the Hoſpitals, which have been long agoe built and endowed on purpoſe to entertain the poor paſſengers in their travels to ſuch waters. This I had not here mentioned, but to introduce our Authors weighty remark; That theſe Waters looſe all their virtues, yea their quantity and bulk alſo, though in Glaſſes, and under the Hermetick Seale, if removed from the Fountain-head; that then they became ſuddenly putrid, ill-colored, looſing the taſt and ſent, and being very noxious, and begetting the Jaundiſe and worſe diſeaſes The like is affirmed by *Dr French*, that the *Knarsborough* Water expires through Glaſs and the firmeſt Seales. And *Dr. Heer* affirmes of his *Spadocrene*, that by ſuch removals, *illas a communibus nihil diſcrepaſſe, ut quibus ſingulis lagenis aquæ vitrum* (which is gueſſed to be half a pint) *deceſſerat.* He adds; *Decedit etiam quantitati—ſi fons hic alio transferatur—quia ſpiritu turgentia plus loci, quam eo privata, occupare amant.* And *Frambeſarius* reports as much of the *Sauvenir*, that in bottles well healed up, there wanted to every *lagena* (flask) one Glaſs of its meaſure (doubtleſs through the loſſe of the volatile Spirits.) Here we want inſtruction, Whether the decreaſe was as well of Weight as of Bulk or Quantity.

Whatever theſe Spirits be, which will neither endure to travel from the place, nor will be confined in any botle, not under any Seal; *Dr Wittie* undertakes to evince by good Proofs, and manifold indications, that theſe *Scarborough* waters have a mixture or tincture of Iron, Allum, Nitre, and probably of a ſmall doſe of Common Salt: Nay, he affirmes punctually (p. 175.) as upon his own Experiment, that 5. quarts of this water contain at the leaſt an Ounce of Minerals, and in dry years, 10. drams; And yet that the uſual doſe for women to remove the Green ſickneſs is 2. quarts of water, and ſometimes more.

He further voucheth his own Trial (p. 179.) that *Knarsborough* water hath 2. Ounces of Salt in a Gallon, though it be 40. miles diſtant from the Sea: And that he hath found alſo by tryal, the 16th part of the Nothern Sea water near *Scarborough* to be a body of Salt (an Ounce of Salt for every pint;) and he conceives the Southern Seas to contain a greater proportion of Salt. Here we muſt diſtinguiſh, that the 2. Ounces of Salt above mentioned, to be found in every Gallon of *Knarsborough* water, belong to the Well there called the *Sulphur*-well: And for the healing properties of the *Sweet well* (as they call the other Well at *Knarsborough*) he refers to the Ingenious and illuſtrious Experiments of Dr. *French* and Dr. *Dean*.

All which being conſidered, we cannot but add, that whoever diſcovers ſuch healing waters, and publickly preſcribes the ſafe and right uſe of them, does really diſtribute larger aud nobler Almes, than if he built and endowed a *Savoy*. For this prolongs life, and reſtores health, (whch is ſometimes better than life) both to rich and Poor, to Natives and ſtrangers, to Neighbors and Travellors.

We cannot take off our hands here, without annexing our Authors related Experiment of *Carps* (p. 25.) which were taken out of Ponds newly drained, and being put with freſh watter into a *Copper* Brewing-veſſel, to be preſerved but for one night, were all found dead in the morning. This he imputes to the poiſonous ſteams of the Copper communicated to the cold water.

Among the Cauſes of *Hot-Springs*, he doth (p. 181.) alledge a conſiderable remark on an Obſervation, made by the late Lord *Fairfax*, of ſome heaps of White powder, which he found ſweat out of the Earth near *Bath* (in *Somerſetſhire*,) which being put into the water, makes it hot; as my ſelf (*ſaith the Doctor*) did experience 5. or 6. years after his Lordſhip had taken it up.

As to his laſt Experimental Demonſtrations and Obſervations, How the fall of Rain and Snow may generally and moſt frequently be the cauſe of our pureſt, livelieſt and moſt laſting Springs, they doe all agree moſt punctually in all circumſtances, with the Experiences and Obſervations of an Antient and very Worthy Gentleman, who lives on the ſide of *Mendip-hills*, and hath had his Eyes always from his Youngeſt days upon the faireſt and fulleſt Sources and Amnery's, I ſay not of *Mendip*. but I think I may ſay of this *Iſland*. This Gentleman hath given to a friend of his the Inſtances and Particulars under his own hand, both for the Springs about *Mendip*, and in other parts of England; and hath many other Antient Witneſſes to joyn with him in the ſame Certificate. And yet Dr. *Wittie* attributes much (ſome will ſay, more than enough) to the Converſion of Air into Water in the *Subterraneous Channels*: For the Illuſtration of which he himſelf knew a Sergeant, belonging to *Hull*, who in a *Diabete* did void above 6. quarts or 12. pounds of Urine every 24 hours, for ſome weeks together, till all his Muſculous parts were diſſolved into Urine; the meaſure whereof did farr exceed the weight of his whole Body, and of his Meat and Drink: In all this time he drank not 3. pints of drink in a day. I know not whether I dare alleadg here Sir *Kenelm Digby's* relation, he recited of the *Nun*, which voided 200 pounds of Water, as from her bladder, every 24. hours, for ſome weeks together: or that Older record of a ſick Maid in *Italy*, who did every day voyd 36. pints or pounds of Urine for the ſpace of 60. days; during which time there were collected 1740. pounds of Urine more than the weight of all her Meat and Drink, that ſhe had taken. *Horum & ſimilium fides penes Authores eſto*.

ERRATA *in* Numb. 50. *to be thus corrected*

PAg. 1001. l. 14. *read* Hippocrates. *p.* 1005. l. 1. *r.* as farr as the Tropick. *p.* 1007. l. 25. *r.* (from the Lizard.) *p.* 1009. l. 14. *r.* are not many. ib. l. 20. *r.* hints, eaſily *p.* 1012. l. 14. *r. not very rare.*) *p.* 1013. l. 16. *r.* this kind ib. l. 18. *r.* to breed. ib l. 21. *r.* Hiſtoire *p.* 1015. l. 22. *r.* their head. *p.* 1019. l. ib. *r.* Zwelfer. ib. *r.* Pharmacopæa.

LONDON,
Printed by *T. N.* for *John Martyn* Printer to the *Royall Society*, and are to be ſold
at the *Bell* a little without *Temple Bar*, 1669.

B
NATURAL HIST

Fig. III.

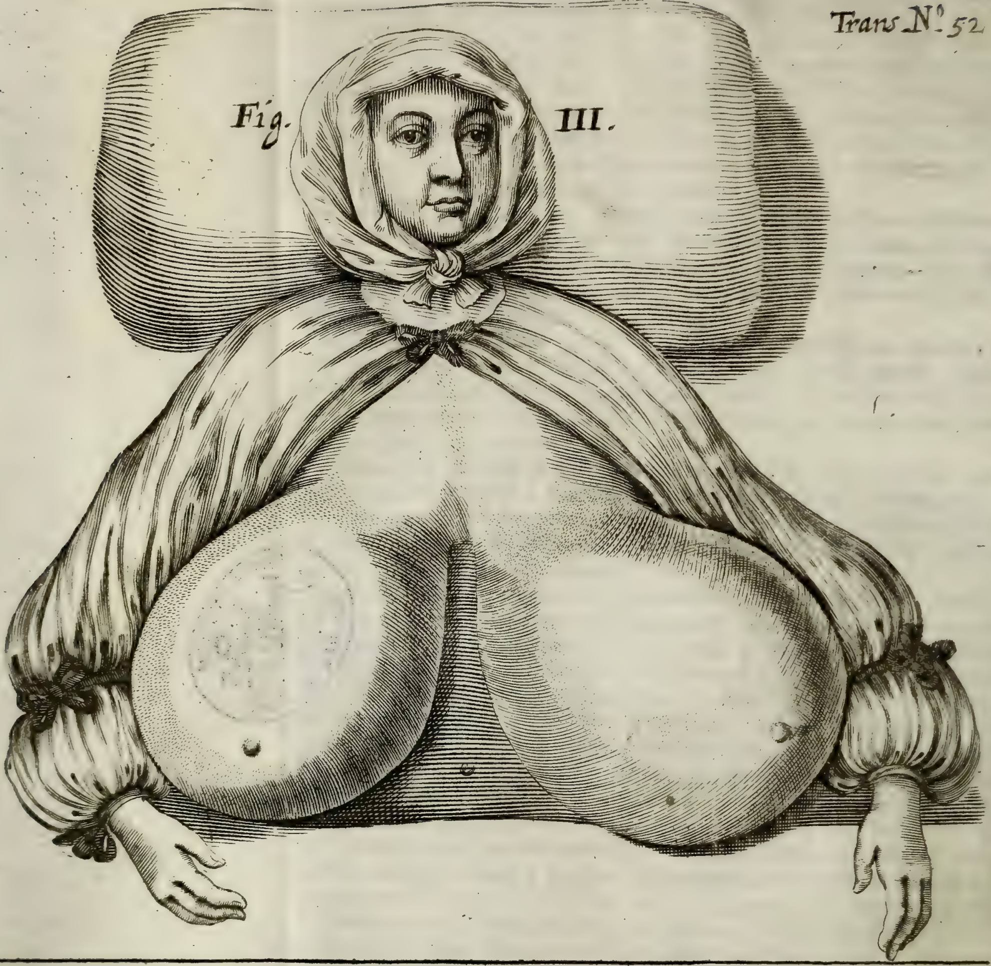


Fig. I.

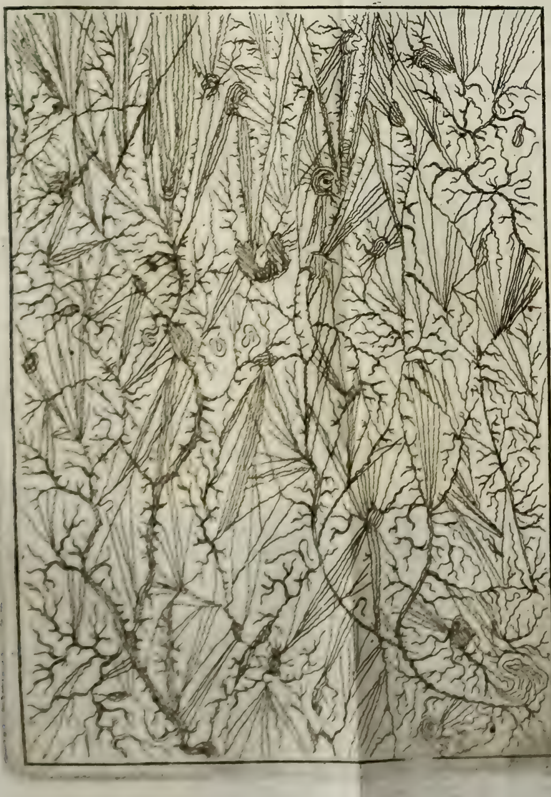
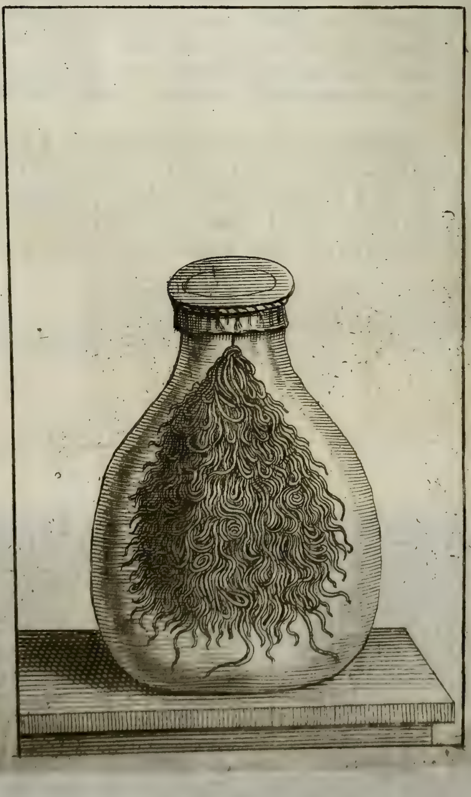


Fig. II.



Numb. 52.

PHILOSOPHICAL TRANSACTIONS.

October 17. 1669.

The Contents.

A particular Accompt of divers Minerals, ſent from the lately burning Mount Ætna, *ſome Obſervations touching ſome of the Organs of Generation. Extracts of two Letters, giving an Accompt of a very ſudden and exceſſive Swelling of a Womans Breaſts. Some Reflections made on the enlarged Accompt of Dr* Witties *Anſwer to* Hydrologia Chymica; *chiefly concerning the Cauſe of the ſudden Loſs of the vertues of ſome Mineral Waters. An Accompt of two Books: I. GUAGING EPITOMISED by MICHAEL DART. II. HISTOIRE NATURELLE Des ANIMAUX, PLANTES ET MINERAUX, qui entrent dans la Compoſition de la THERIAQUE d' ANDROMACHUS, par M. CHARAS.*

A particular Accompt

Of divers Minerals, caſt up and burned by the late Fire of Mount Ætna; *mentioning the ſeveral Specimina, expected in* Numb. 51. *p.* 1031. *from ſome ingenious Marchants of* England, *being upon the place, and ſince come to the hands of the Publiſher, for the Repoſitory of the* R. Society.

SInce it cannot but conſiderably conduce to the rendring a rational accompt of the Cauſe of ſuch Fiery Eruptions, as are frequently made by divers Mountains, if the matters, by them caſt up, be well examined, in regard that if they are found to be of an eaſily inflamable nature, they may quickly be kindled by ſome falling ſtones, which breaking in pieces may ſtrike ſparks into and ſo ſet on fire ſuch combuſtible matter, they light upon; It was thought, it would not be amiſs, by the favour of our friends in *Sicily*, to procure from the lately flaming Mount there, what Minerals they ſhould be able to get upon the place. And accordingly we received by a ſhip lately arrived from *Meſſina*;

Firſt, a good quantity of *Aſhes*, taken up in divers parts of and about *Ætna*; ſome at the top or mouth of the new made Mountain; ſome a mile off, ſome four, ſome ten miles, ſome but halfe a mile diſtant, and others on the skirts of the ſaid Mount; whereof the four firſt were found to agree well enough with their diſtances, but the two laſt to differ much both from the former and from one another; the former 4. ſorts having been found very dry like duſt, but the two latter being ſtill very moiſt, though in *Sicily* (as we are informed) they have layn expoſed a good while to the hot Sun; beſides that the two laſt differ from one another, in that one ſort of them conſiſts of hard and ſmal lumps, the other, of very ſoft durty grains, yet both moiſt and of a vitriolate taſte.

Secondly, Some of the *Cinders*, which the people of *Sicily* call *Sciarri*, whereof ſome are courſer, taken up at ſome diſtance from the Mouth; and of theſe ſome black, with a cruſt of Brimſtone, ſome of a red hew; others finer, ſaid to be got out of the gutturs of fire at the very Mouth. Both theſe kinds are light; but then there is a third ſort of Stone, very ſolid and ponderous, which ſeems to be made up of a conflux of divers Minerals, melted together.

Thirdly, A piece of Sal Ammoniack, and ſeveral pieces of Sandever, beſides thoſe moiſt Vitriolate Aſhes abovementioned.

All which was accompanied with a *Mapp* of that part of the Country, where the Fire hath run; in which Mapp the annexed Scale of a *Mile* ſhews, that the Fire ſpred about 3. miles in breadth, and 17. miles in length; the ſame being now quite extinct, but that only in the clefts or hollownes's of the rocks of *Sciarri* ſome fire ſtill remains glowing.

Some Obſervations

Concerning the Organs of Generation, made by Dr. Edmund King, *a Fellow of the R. Society, and by Dr* Regnerus de Graeff, *Phyſitian in Holland; which later occaſioned the publiſhing of the former.*

The Obſervations of the former *we ſhall here declare, as he preſented them in writing to the R. Soc. the 17th of* December 1668, *which was as follows;*

YOu may remember, that about 3. weeks ſince I brought the *Teſticulos Cuniculorum marium* diſſected in ſeveral ſhapes; which appear'd to ſeveral of this illuſtrious Company, as well as to my ſelf, to be indeed made up of Veſſels; and I then had particularly ſhow'd them to M. *Hook* and ſome others, and the manner how they lay; who ſeem'd to be fully ſatisfied by the help of a good Glaſs, they then made uſe of. And being deſired, to give in the Account in writing, I cannot but affirm here, that I find the Veſſels in the *Teſtes* of this kind of Animals to lye in round folds, in the manner of the little inteſtins, but both ends of each roll meeting at their inſertion, which ſeems to be made into the *Ductus Nervoſus*: And every one of theſe little rolls are very curiouſly embroidered with other veſſels, which I Judge to be Veins and Arteries by reaſon of their reddiſh colour; appearing in them even to the bare Eye.

Theſe little rolls ly in ranges, having a kind of uniformity not unpleaſant to behold by a good light. But I do not mean, that every one of theſe rolls is one entire tube, but conſiſts of many tubes, beſides the ſaid Embroidery of Veines and Arteries: For, when I cutt one of the ſaid rolls tranſverſe, there ſeem'd to me (and ſo, I ſuppoſe, will it do to any, that think it worth examining,) 5.6. or more diſtinct tubes in one roll, contain'd as 'twere, in one common *membranula*; but the fine texture and tenderneſs of them is ſuch, that they will not admit of expanſion in ſuch a manner, as ſome other *Teſtes* will, and eſpecially as that of a *Ratt* is ſaid to doe by Dr *de*

Graeff

Graeff (if we miſtake him not;) yet if it ſhall appeare, that they are really made up of veſſels, though of never ſo many ſorts, I humbly conceive you will not think the Experiment loſt, becauſe I ſuppoſe the chief thing intended by theſe trials to be, that it may be well known, what indeed the Body of the *Teſtes* is made of; Whether indeed it be a *Congeries* of Veſſels and Liquors without any intermediate ſubſtance, as was aſſerted by me to many of this Honorable Company, ſeveral years agoe, concerning moſt if not all parenchymous parts, which was inſerted in Numb. 18 of the *Ph. Tranſactions*, ſince which time I have made ſeveral Experiments of the ſame kind, about the *Teſtes*, the *Pancreas*, and other ſo eſteem'd *Glands*; and as far as I have examined them, I find them to be only a Texture of fine Tubes or ducts, with more or leſs liquor, without any other ſubſtance.

But perceiving, the *Teſtes* of *ſeveral* Animals to be *variouſly* compoſed and intertext; I proceeded *ad Teſticulos Tauri*, which I have diſſected and ordered ſeveral wayes; ſome boyled, others broiled, others infuſed in Spirit of wine, hot and cold; *&c.* and upon the beſt examination, I can make, I cannot ſee any of this intermediate ſubſtance, or indeed any thing elſe, that is not Veſſel or Liquor.

Now in obedience to your comands, I have added another Experiment, and that is *Teſticuli humani*, (the exact knowledge of whoſe fabrick we ſuppoſe to be chiefly aimed at in this kind of Inquiry,) hoping to prove it clearly, and perhaps to put it out of diſpute, That it is nothing elſe but a *Congeries* of Veſſels of various ſorts, and their ſeveral Liquors; and that there is no ſuch thing as an intermediate ſubſtance (by what name ſoever it be call'd;) And to demonſtrate this, I think, it will evidently appeare to the bare Eye, by what I have here expanded, * which is the true genuine ſubſtance *Teſticuli humani*, I mean, the Body of it, after the *Tunica albuginea* is remov'd, without any addition or diminution, excepting only what Liquors are dryed up during the time of the Expanſion, which colud not be prevented in making ſuch a Scheme of it, as

* *See Fig. 1. which repreſents only the 4th or 5th part of what was exhibited of the ſame* teſtis *after the ſame manner with this on Glaſs.*

as this is. And this is continued from one end to the other of the Glaſs, on which you ſee it exhibited, in ſeveral places, without breaking; which breaking yet does not at all prejudice the truth of this Experiment. And although I had not time to open every part, which you ſee to be like that ſubſtance, I deny; yet I can order it ſo, as to ſhow you with eaſe, that that alſo is nothing but Congeries of Veſſels, as aforeſaid, not yet opened; fix on what part you pleaſe.

And if it ſhould be objected, that this may be drawn out into *ſeeming* Veſſels, which yet may not be *really* ſuch; I anſwer, that theſe Veſſels have the ſame appearance in the Body of the *Teſtis*, as to denote them ſuch, before they are drawn out; and in the extenſion it does ſometimes ſo happen, that one of them will extend eaſily near halfe a yard long, before it breaks, though ſo exceeding delicate and tender, as you may imagine: And when it is thus extended, it hath a kind of reſemblance of the corrugations of the *Epididymis*, and keeps the ſame figure and magnitude in the whole extent of them, as to the ſight, unleſs they begin to dry, and then you may ſee them looſe their *girations* upon ſtretching: as you may ſee of both ſorts on the Glaſs above mentioned.

And if the greateſt part of theſe Veſſels are Arteries, or other Veſſels, that immediately receive liquors from them; I may prove, I think, from another Experiment, made by Injection into a part of the *Arteria præparans*, before I began to expand the Body of the *Teſtis*; whereupon opening the part, which I ſaw diſcoloured, I found, that many of theſe Tubes had received ſome of the fine particles of that matter, which I tinged my injected Spirit with.

And to prevent another Objection, that might ariſe, *viz.* That theſe particles might poſſibly change their colour only outwardly; I uſed other endeavours to aſſure my ſelf, that the ſaid particles were indeed included within the Cavities of theſe tubes. In the doing of which, I did moiſten thoſe two Tubes with Spirit of wine, to ſee whether that would remove or alter thoſe particles; but finding no ſuch thing, I prickt and open'd with a fine needle part of the containing tube; whereupon I ſaw iſſue forth ſeveral of thoſe liquid particles afore-mentioned: Which aſſures me farther that this is a mere Scheme or Congeries of veſſels.

I have made ſeveral other Experiments of this kind, about other parts of the Body; not to mention the Muſcles, Heart, and Kidneys, becauſe I ſuppoſe, that few men will now undertake for a *parenchyma* in them. And as I have opportunity, I ſhall ſhew, I hope, that all ſorts of *Glands* (ſo called) are nothing elſe but Veſſels (and their Liquors) variouſly wrought, and receptacles of ſeveral Liquors for divers uſes; the difference of which alters their Colour, Conſiſtence *&c.* My meaning is, that there is in no reputed *Gland* any other thing, than in the Body of the Teſtis, *viz.* That it hath not this or that intermediate ſubſtance, but that the Liquors, regularly come and goe to and through them in fine tubes (in ſuch and ſuch heaps and figures, as may make them appeare ſo and ſo form'd in ſeveral parts of the Body, where they are ſcituated;) As alſo, that the more conſpicuous Veſſels of the Body have other veſſels, that help to make up their Coats, and ſerve for the nouriſhment of the ſame, beſides ſuch, as import or export thoſe liquors, for the conveyance of which they were deſigned for common uſe. But of this hereafter, as occaſion ſhall ſerve.

So farr Dr King: As to Dr. *de Graeff*, we ſhall deliver what he lately imparted to us upon this ſubject, in his own words, extracted out of his Letter dated *July* 25. 1669. at *Delft*: accompanied *cum Teſticulo Gliris diſſoluto, & tranſmiſſo in Spiritu vini*; repreſented in *Fig.* II.

Quod Clar. D. Clarck *ait, Se parenchyma (quod ſuccum quendam denotare dicit affuſum vel effuſum & aliquomodo concretum in vaſculorum & fibrillarum interſtitiis,) in Teſticulis virorum & aliorum etiam animalium, teſtimonio ſenſuum oſtendere poſſe; hoc Ego, pace tanti viri dixero, nonniſi Autopſià edoctus admittere poſſum. Quandoquidem ſæpiſſimè Hominum aliorumque Animalium teſticulos, exceptis tenuiſſimis quibuſdam membranulis, ita diſſolverim, ut ne umbra quidem talis parenchymatis remaneret; imò, quod magis eſt, quorundam Animalium teſticulos ita diſſolvi, ut viſus acie ne quidem membranulæ illæ conſpicerentur. Et ut verba mea factis comprobem, mitto ad Te* Gliris *teſticulum meo modo diſſolutum, ut videas, an Glandulæ tales in Teſtibus (qua-*

les proponit Clar. Dn. Clark in Epiſt. ſua, 18. Maji. 1668. *Tranſactionibus Philoſophicis inſerta) vel etiam Parenchyma tale, quale in Epiſt. ſua* 10. Maji, 1669. *deſcribit, reperiatur. In hunc ferè modum reliquorum Animalium Teſticulos diſſolvere poſſum, eâ tamen diverſitate, ut in nonnullorum Teſtibus aliquæ membranulæ tenuiſſimæ, & in quorundam, radix præterea Epididymidis Highmori remaneat.*

So farr theſe two induſtrious Phyſitians; which though it looks very fair to evince, that the *Teſtes* of Animals are made up of nothing but Veſſels and their liquors, yet doth our Learned and Inquiſitive Dr. *Timothy Clarck*, and divers other Ingenious and expert Anatomiſts and Phyſitians ſtill doubt, whether that be ſo indeed, conſidering that not only it cannot be denyed, that this curious heap of Strings or ſuppos'd Veſſels was at firſt cov'red all over with a Mucous matter (which in ſo fine and tender a part may well be thought to ſerve for a *parenchyma*,) but alſo that Monſieur *de Graeff* muſt himſelf grant, that in the ſaid part there are found certain ſmal Membrans beſides thoſe Veſſels, he is aſſerting; ſuch another ſubſtance being conceived to be highly neceſſary to ſerve for a *medium*, whereby that compounded liquor, which from the greater Veſſel paſſeth into the minute arteries, nerves and lympheducts of the *teſtes*, may be ſecreted, and according to the different nature and figure of their ſeveral particles conveyed into thoſe ſeveral ſmall and ſubtil veſſels.

An Extract of a Letter

Written by the Learned Dr. William Durſton, *Phyſitian at* Plimouth, *to the Right Honorable the Lord Vice-Count* Brouncker *as Preſident of the R. Society; concerning a very ſudden and exceſſive Swelling of a Womans Breaſts.*

My Lord

IN obedience to the commands of the Right Honorable the Lord Ambaſſadour for *Barbary*, I preſent your Lordſhip with a *Phæmonenon* and matter of fact in Nature, which, for its rarity and prodigiouſneſs, may, with a leſſer check to me from your Lordſhip for the preſumption, and a leſſer regret for the avocation, obtain the favour of your peruſal. The thing is evident, and ſhews itſelf, and can withall be atteſted by thouſands, but above all the reſt by his Excellency, the ſaid Lord Ambaſſadour, who was an Eye-witneſs of it, and impoſed this task on me, of giving your Lordſhip a perfect Narrative of the wonder, which is as follows;

Elizabeth Trevers, 23. or 24. years of age, fair of complexion, brown-hair'd, of an healthy conſtitution, low of ſtature, of honeſt repute, but of mean and poor parentage, near this Town, was on Friday July 3d. *1669.* in good health, and went well to bed, where ſhe took as good reſt and ſleep, as ever before, but in the morning, when ſhe awaken'd, and attempted to turn herſelf in her bed, was not able, finding her Breaſts ſo ſwell'd, that ſhe was affrighted to an aſtoniſhment. Then endeavoring to ſit up, the weight of her Breaſts faſtned her to her bed; where ſhe hath layn ever ſince, yet whithout all pain and weakneſs either in her Breaſts, or in any other part.

This being nois'd abroad, ſeveral Phyſitians and Chyrurgions reſorted to her: ſome propoſed cutting off her Breaſts, which I was wholly againſt, adviſing for the preſent only an emollient and temperately warme *fotus*, and once gave her a *Bolus* with * * * * * *; upon the taking of which ſhe had ten motions *deorſum*, and the ſwelling ſomewhat abated; but the Maid was ſo weaken'd upon it for 2. or 3. days after, that I durſt not attempt any thing of that nature ſince; *ſed quia paſſa fuit ſuppresſionem menſium per ſex retrò menſes*, *Diuretica non nulla*, & *ſanguinis menſtrui prolectamenta præſcripſi*, intending alſo Phlebotomy. The *Tubuli* or pipes of the Breaſts are all very hard and ſwelled; and indeed the whole breaſts ſeem to be nothing elſe but thoſe *tubuli*, and little or nothing of wind or water. As near as we can gueſs, the left breaſt weighs about 25. pounds, but the right ſomewhat leſs. And the skin of the Back, Neck and Belly ſeem to be drawn towards the Breaſts to ſerve for the diſtenſion. The meaſures of the Breaſts are theſe;

The

See Fig. III.	Feet.	Inch
The Circumference of the right Breaſt	2.	7
Of the left Breaſt	3.	1 $\frac{1}{2}$
The length of the right Breaſt from the Coller-bone	1.	5 $\frac{1}{2}$
The length of the left Breſt	1.	7 $\frac{1}{2}$
The breadth of the right Breaſt as it lyes	1.	1
The breadth of the left	1.	4 $\frac{1}{2}$

Thus farr, My lord, the matter of fact, faithfully related.

Now what ſhould occaſion thoſe monſtrous tumors of the whole Breaſts, and that ſo ſuddenly in one night, keeps us in great ſuſpence. There occurs nothing in this point ſatiſfactory in the writings of *Platerus*, *Rhodericus à Caſtro*, *Fontanus*, *Foreſtus*, or any other of the Moderns, that I have ſeen, writing *de Morbis Mulierum*, ſuitable to what may be offer'd upon the *Data* of the Circulation of the Blood, the Lymphæducts, and the *Vaſa Chylifera Thoracica*, and probably ſome Capillary veſſels branching thence (in their progreſs to the *Sub-clavials*) through the Intercoſtal Muſcles into the Breaſts. I humbly beg pardon for this tediouſneſs *&c.*

Plymouth, Julv 1[illegible], 1669.

This Narrative having been produced and read at the R. Society, *and the Author of it thanked for his communication, and deſired to impart what he ſhould further obſerve in this very odd Accident, he was pleaſed to write, ſome while after, a ſecond Letter to the Publiſher, as follows;*

Sir.

I Had written to you ere this, but that I unhappily miſlaid your Letter among other papers; but having, after much ſearch, found it again, I return the Moſt Honorable Society and you my very humble thanks for your invitation of me to continue my Obſervations about the vnuſuall ſwelling of the Breaſts, heretofore deſcribed.

About the beginning of this month, our prodigious woman in Coughing brought up at ſeveral times ſome blood; but this I ſoon took off; and at that time there appeared ſeveral cutaneous ulcers upon her Breaſts and other parts, *& abundè in verendis* (ut à fæminis edocebar) which laſt I cured; but thoſe on her breaſts in part remain, and daily diſcharge, by the ſole application of Cole-leaves, good quantity of ſanious matter. And the Patient complaining alſo at that time of grievous interjuncture pains, eſpecially vpon the *Tibia*, I ſuſpected *&c.* and applyed *Empl. de Ran.* * * * and gave her 3. ſucceeding mornings * * * for a doſe. The third day, it wrought *ſurſum & deorſum* pretty briskly; after which her pains vaniſh't and many of thoſe *vlcuſcula*; and her breaſts (which, ſince her Caſe, formerly ſent up, were grown conſiderably bigger and very painful) much leſs'ned, and her pains alſo; and ſhe, though drooping much before, and out of hopes of life, exceedingly revived. This indicated to me, what I was further to do for her. I gave her on ſunday laſt * * *; which wrought upward plentifully; and ſhe daily gets ſtrength ſince, and her Breaſts abate. I deſigne to ſalivate her, in hopes to correct that vitious ferment, which is ſpued out of the *Genus nervoſum* into the Breaſts, and contributes much to thoſe tumors. But I ſhall now ſtop my hand, *&c.*

Plymouth Septemb. 17. 1669.

Some Reflexions *Made on the enlarged Accompt of Dr* Witties *Anſwer to* Hydrologia Chymica *in Numb* 51. *of theſe Tracts; chiefly concerning the Cauſe of the ſudden loſs of the vertues of Mineral waters.*

Theſe Notes were made by the Learned Dr Daniel Foot, *in a friendly Letter of his (dated October 11th. 1669.) to the Publiſher, as follows.*

Sir.

YOur laſt publiſht *Tranſactions* N° 51. have adminiſtred the occaſion, and the Candour, I know you poſſeſs, hath encouraged me to give you this trouble. In your enlarged accompt of D. *Witties* Anſwer to *Hydrol. Chymica*, p. 1039. l. 21. you ſay; *This I had not here mentioned, but to introduce our Authors weighty remark; That theſe waters looſe all their virtue, yea their quant and bulk alſo, though in Glaſſes and under the Hermetick ſeal, if removed from the fountain-head* &c. Now, Sir, 'tis a truth, if not univerſally, yet generally known and aſſented to by unlearned as well as learned, that ſome ſort of Medicinal waters looſe their virtue, if remov'd to any conſiderable diſtance from their fountain-head; but others do not, at leaſt not ſo ſoon. To this laſt ſort belong ſuch, as are our *Barnet*, *Epſham* and *Dullidge* waters; to the other ſort belong our *Tunbridg*, *Aſtrap* and * *Stall-bridge*-waters; aud all ſuch like here or elſe where: And the common uſage of the Sick, taken from the adviſe of their Phyſitians, and the Experience of all, in repairing to thoſe reſpective places, ſufficiently proues the common conſent thereunto.

* *This was in* Numb. 51. *by a miſtake placed in* Somerſet, *whereas it lyes in* Dorſet-ſhire.

But though the effect be ſo plain and manifeſt, yet the cauſe thereof ſeems not to me ſo plainly diſcovered; and becauſe you are pleaſed to your fore-cited words to ſubjoyne theſe; *And even their quantity and bulk alſo, though in Glaſſes and vnder the Herm. Seal &c*: I ſuppoſe, you intimate and offer, that the cauſe of the loſs of their Medicinal vertues is upon the loſs of their quantity and bulk: which alſo you aptly ſtrengthen by the authority of the famous Doctors, *French*, ab *Heer*, and *Frambeſarius*; and then in a parentheſis you put altogether, and cautiouſly ſay (*doubtleſs thorough the loſs of the Volatile Spirits*) &c. And in the beginning of the very next paragraph you goe on thus; *Whatever theſe Spirits be, that will neither endure to travel from the Place, nor will be confined in any bottle, nor under any ſeal* &c. So that the ſum of your *Conjecture* (for as other you propoſe it not) is, That this loſſe conſiſts in the Avolation of ſome moſt ſubtle and penetrating Spirituous parts, not to be impriſoned by any incloſure imaginable, but will find their way out, and leave the waters bereft of virtue, and decreaſed in quantiy too, and (what more is) ~~perhaps~~ of their weight alſo, eſpecially if they looſe ~~of their~~ quantity. But to this laſt you modeſtly add; *Here we want inſtruction, whether that decreaſe was as well of weight, as of bulk* &c.

That this Conjecture of yours concerning the Cauſe of the loſs of virtues in theſe waters carried from their Spring, may be true, I do not abſolutely deny, but further acknowledge, that it is the ſentiment of very many, if not all, Phyſitians and Naturaliſts, that have concern'd themſelves with the conſideration thereof; and I my ſelf have entertained the very ſame thoughts of it, and doe not now but ſuppoſitively relinquiſh them. But having lately, in reading *Tachenius's Hippocr.Chymicus* (newly recommended by your ſelf in N°. 50. of your *Tranſact.*) found c. 16. ſomewhat relating to this matter; I began by the encouragement of his authority to reſume ſome Conjectures touching the ſame, which I had, if not abandoned, yet kept ſuppreſt in ſilence, which indeed are of another kind, but how true I yet know not. Wherefore I thought, it might not be very un-accepable to you, if I deſired you, publickely to give notice of theſe Conjectures, that the Learned may reaſon and find out the truth of them; whence may reſult no few nor very unuſeful diſcovery's for the increas of knowledge, the benefit of mankind, and the glory of the Creator of al'. In order thereunto I deſire, you will propoſe theſe or ſuch like Queries;

1. Whether by Chymical reſearches it wes ever yet or can be found, that ſuch waters as the above-ſaid, ever yielded either a Vinous or an Acid, or any other ſort of Spirits, that were eithet inflammable, or un-inflammable, or flying over the Helm from the fire.

2. Whether all theſe ſorts of Waters, when they are moſt cloſely ſtopt up, and ſo let ſtand, or conveyed to ſome diſtance, doe not let fall a ſediment (moſt commonly) yellowiſh, or of ſome ſuch colour, when they are become effæte in their veſſels.

3. Whether, when they are let ſtand only, and not moved by carriage, they do not ſooner become caſtrated, and ſooner precipitate an *Ochre* to the bottom?

4. Whether ſuch an *Ochre* is not found in all their Spring-heads, and Streams alſo; but more in the Head than in the Streams, eſpecially if iſſued there-from to a good diſtance.

5. Whether it may not be found upon due Obſervation, that two Bottles of the ſaid waters, whereof the one being induſtriouſly ſtopped, the other left unſtopt, and both equally permitted to ſtand ſtill or equally moved, will not equally looſe their virtues Medicall in the ſame ſpace of time, and have the ſame precipitated ſediment, and be of the ſame taſte, colour, and alike diminiſht in quantity, with divers others ſuch like circumſtances?

6. Whether two Veſſels, diverſified in their matter; and conſequently in their parts, pores and figures of the whole (as e. g. a Glaſs-bottle and an Oxe-bladder, or any two ſuch like) fill'd with ſuch waters, will not yeild the like *Phænomena* in all circumſtances, as in the 5th *Query* are mentioned?

7. Whether it may be deviſed, how to preven tall precipitation of a ſediment in the Waters veſſeled up; and then to obſerve thereupon, whither their vertues would not be kept entire during ſuch a prevention?

8. Whether any Obſerver ever found the Waters enervated but found withall an Ochre, let fall to the bottom or ſides of the containing veſſel?

9. To be brief, Whether the *Phænomenon* of loſs of vertues in ſuch Waters may by an *Hypotheſis* of an inteſtine Precipitation of their parts, wherein thoſe vertues conſiſted, be as well (if not better) explicated, than by the *Hypotheſis* of an Avolation of Spirituous parts through all Veſſels and cloſures whatſoever?

Which Hypotheſis that it may be the better weighed, I ſhall only exhibit it, and leave it to the Ingenious and Learned to conclude concerning it.

Firſt therefore it is generally received amongſt moſt, eſpecially the more polite, Chymical Authors and Students, That, if any Medical vertues be in Minerals or Metals, it conſiſts in their Sulphurs; which are of a Volatile and Alcaliſate property; eſpecially when not intimately conmmix't with, or after commixtion perfectly freed from their Mercurial parts.

Next, its as much received, even to become a Cymical Maxime, That Acids and Alcaly's mutually operate upon one another to a ſatiety, to an abating, and (if circumſtances correſpond) to an utter amiſſion of their former activities, and laſtly to a production of a *Tertium neutrum.*

Again they alike conclude, that Salts act beſt in a State of Solution. All which Premiſes thus concenter in this Hypotheſis;

That the Waters, which *materially* make ſome Springs, paſſing under ground by the veine of ſome Mettal, which yet is *in fieri*, having firſt taken up of an Acide Salt which is in the Earth, thereby catcheth hold on the immature Sulphur of that

Metal;

Mettal, and preſently glides it along with it ſelf to the Springs orifice, and from the moment of the *Sulphur* and Acide *Salt's* meeting and contact begins a mutual action and reaction upon one another which never ceaſeth, till both are imperceptibly ſpent, and blended into a new Body, which then the water lets fall, and we call an Earth, Ochre, or *S*ediment: After the production of which Ochre, the Medicinal vertues of the immature *S*ulphur is lockt up into the inſeparable embraces of the Acide *S*alt, and ſo is loſt, or at leaſt diſappears. But this mutual action and reaction may laſt, till the Waters iſſue out of the Earth, and for ~~ſome~~ ſmall time longer, and ſo long their Medical vertues are to be imparted, and no longer.

This, *Sir*, is the Hypotheſis of *Tachenius* (if I rightly apprehend him) which I ſend, not to have it Juſtle out the more received one, or any other that may be propoſed; but that it may have its Tryall, and accordingly may live or dye. I could alledge more in its behalf, eſpecially in the particular of ſuch a Body, as we commonly call an *Ochre*; reſulting from divers Experiments of Vitriol: but I have treſpaſſed too much already to hope for pardon from any, but *&c.*

An Accompt of two Books

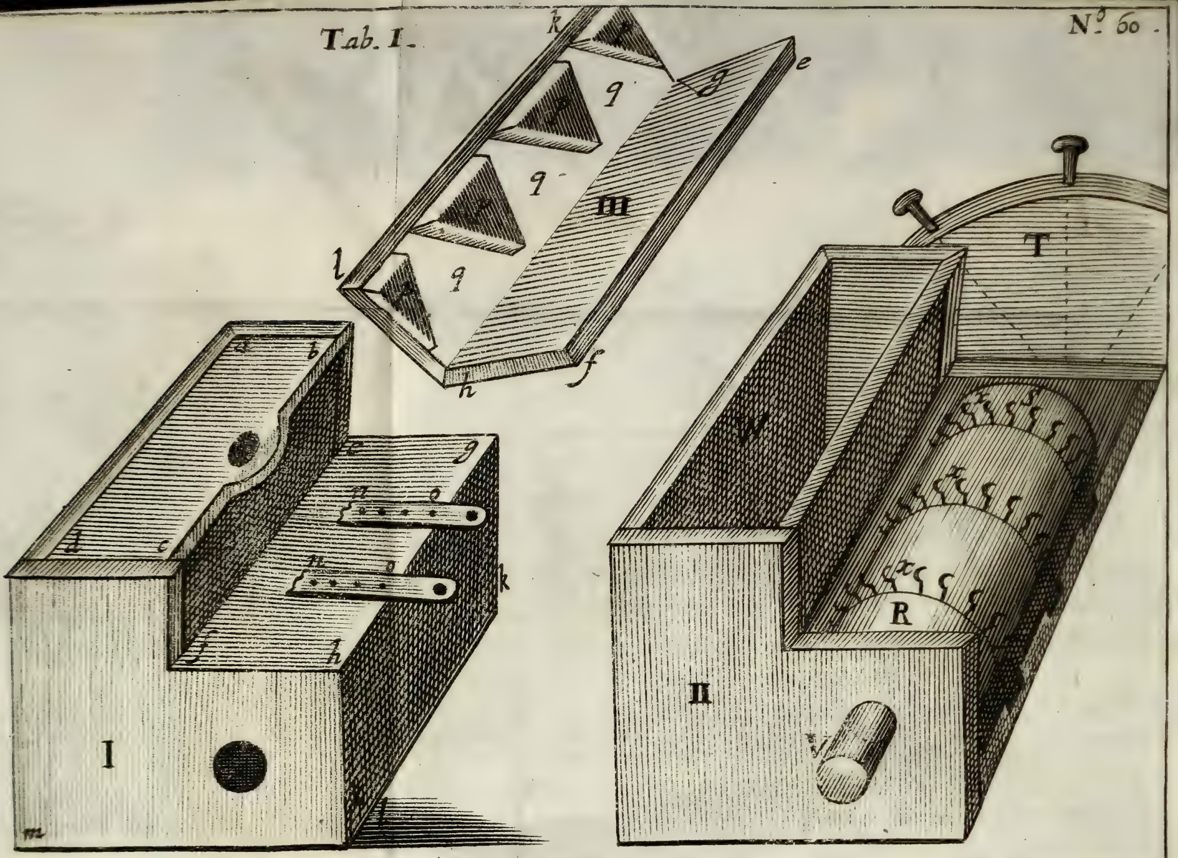
I. *GUAGING EPITOMISED, by MICHAEL DARY. London, Printed by* W. Godbid *1669. upon one* folio *page.*

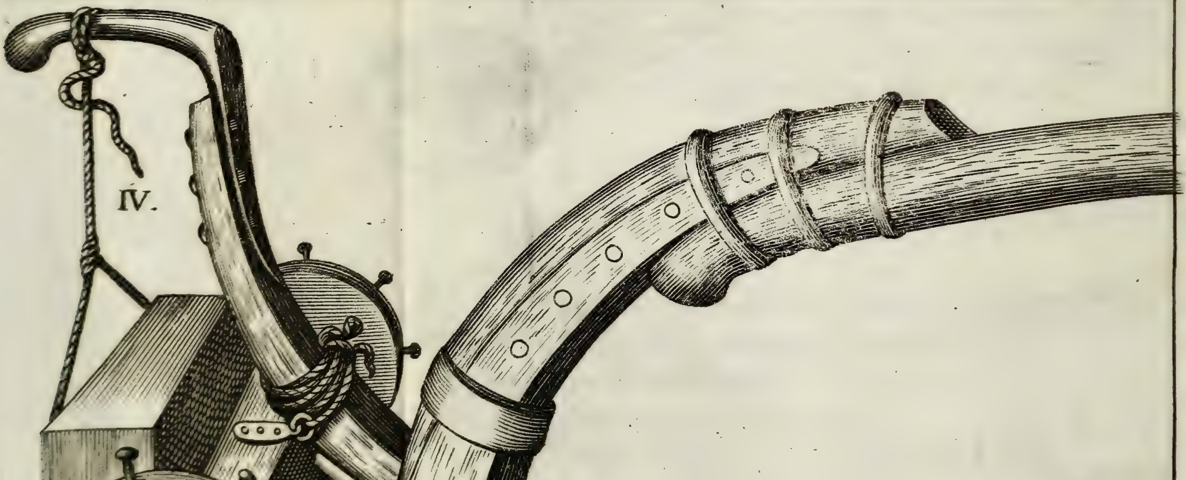
A Table of *S*quares and Cubes is of general uſe, but more particularly in *Guaging*, for taking away *Proportional* work in computing the Contents of Brewers Tuns from inch to inch, or by as great portions as you pleaſe; or for making the Tables of Gallon-meaſure for Mr. *Oughtreds* Guage-Rod: Yea each kind of Table doth much expedite the *Guaging* of *Caske*, as may be ſeen in this Printed Sheet of Mr *Dary*, wherein he ſuppoſeth, that a Beer or Ale-Gallon contains (according to the late Eſtabliſhment by Law) 282. Cubical inches; a Wine-Gallon according to cuſtom and Experiment, 281. Cubical Inches: And he takes an Example (of a *Canary* Pipe) whoſe diameter at the $\left\{\begin{array}{c}\text{Boung}\\ \text{Head}\end{array}\right\}$ is $\left\{\begin{array}{c}32\\ 22\end{array}\right\}$ inches, and Length 44 inches.

And

BRITISH MUSEU
NATURAL HISTO

Tab. I.





And if you ſuppoſe the Heads of ſuch a Cask to be two Plains erect to the Axis, and alike remote from the Center, cutting off both ends of the figure produced, then, if the middle *fruſtum*, ſo intercepted, be computed as

						The Content in Wine Gallons is about
The	Solid Zone	of	a	Sphæroid		$126\frac{1}{4}$
				Parabolical		$115\frac{1}{2}$
				Spindle.		
			two	Cones.	Of the ſame	$110\frac{1}{3}$
				Parabolical	baſe and	$112\frac{8}{10}$
	Trunci			Conoids	height	

the Method of Calculation being very eaſy by either ſort of Tables, and of great affinity in all theſe figures. And whereas the Learned have commonly ſuppoſed, Cask to be the midle *fruſta* of *Spheroids*, and given Rules accordingly for Guaging them, thoſe ſuppoſitions, as Vintners and others upon experience aſſert, are found too much to enlarge the Capacity, ſo that a *Canary* Pipe, that is reputed to hold about 126. gallons, upon Experiment hath been found to contain but 116. gallons: And to determine, what figure is moſt proper to be admitted, ought to be built upon ſuch an Experiment as this;

Conceive a Caske to lye upon an Horizontal Plain with its *Axis* paralel thereto; and Perpendiculars on the outſide of the ſmooth boards of the Cask to fall, from the Head, Boung, and ſome intermediate point between, upon the Plain or Floore; and in like manner the axis to be deſigned: Then find out ſuch a curved line of ſome property, that may paſs thorough the ſaid Points, which conceive to have a rotation about the Axis-line: the round ſolid ſo made may be taken to repreſent the Cask; and in the Writings of *Geometers* divers Curves are to be found, that are capable of paſſing through ſuch Points and their round Solids meaſured. But if the Reader think this too nice and troubleſome, and that the *Sphæroid* way is too great, and the *Parabolick* ſpindle too little, then the Author gives ſcope enough between; ſhowing how to contrive ſuch Rules, as ſhall beſt agree with Experience.

II. *HIS-*

II. HISTOIRE NATURELLE DES ANIMAUX PLANTES ET MINERAUX, *qui entrent dans la Compoſition de la* THERIAQUE D'ANDROMACHUS; *par M. Charas In* 12. *A* Paris.

AS there are above 60 ſorts of different druggs, which are ingredients of this no leſs difficult than famous and uſefull Medicine, which was invented by *Andromachus*, Phyſitian to *Nero*; and as thoſe drugs are ſubject to be ſophiſticated, and require different preparations, ſo there are few men, that are ſufficiently skill'd to chuſe aright all thoſe ingredients, or dextrous and patient enough to prepare them well. The Author of this Book treats of this celebrated medicament, and not only teacheth the way of compoſing it, but interſperſeth many not inconſiderable remarkes touching the nature and vertues of all the Druggs, which compoſe it.

He is of opinion, that commonly there are committed many faults in preparing the Ingredients, of which the Theriack is made up. E. g. When the Vipers are prepared, the cuſtom is to whip them; thereby to make all the venom go to the head, which is cut off when they are ſufficiently enraged. They alſo boile the fleſh, thereby to draw forth what venemouſneſs may yet reſt therein, and their bones are caſt away as uſeleſs. Whereas he ſaith, that it being by Experience evident, that all th venom of the Viper is in his Teeth and Jaws, that whipping is not on to no purpoſe, but alſo dangerous, in regard that the Spirits being chafed and irritated may beget venom in the body, where was none. He aſſerts alſo, that the water, in which the viper-fleſh is boyled, carryes away all the vertue; and that the bones that are thrown away are no leſs uſeful, than the fleſh itſelf.

He takes further notice, that *Opium* hath not thoſe ill qualities, which many aſcribe to it, who teach, that it ſuffocateth the natural heat, and that there need no more than 3. graines to diſpatch the luſtieſt man: whereas he aſſures, that himſelf hath taken 6 graines of it without having been more ſtupifyed by it, than he uſed to be; and that inſtead of being debilitated, he hath found himſelf ſtrengthned by it. He ades, that he knows a man of a conſtitution delicate enough, who hath taken of it to 30. grains, and yet not found any troubleſome accident upon it; on the contrary that the Patient hath found himſelf ſo well after it, that he continued to take the ſame doſe twice or thrice a week.

He obſerves alſo, that whereas it hath been diſputed, what might cauſe the difference of Colour in the White and Black *Pepper*, ſome believing, that Pepper gathered before it was ripe, looked white, but became black in ripening; others pretending, that as the ſame Vine-ſtocks, which produce white grapes, do not bear black ones, ſo they are different plants, that bear Pepper of different colour; our Author affirms, that this diverſity of Colours proceeds thence, that the black Pepper is covered by its skin, which the white is bared of &c.

ERRATA *in* Numb. 51.

P*Ag.* 1028. l. 7, *r.* by a bank of. *ibid.* l. 9. *r.* preſerve this bank. *p* 1039. l 33 *r.* botles well ſealed up.

Printed by *T. N.* for *John Martyn* Printer to the *Royal Society*, and are to be
ſold at the *Bell* a little without *Temple-Bar*, 1669.

Numb. 53.

PHILOSOPHICAL TRANSACTIONS.

November 15. 1669.

The Contents.

A Deſcription of Dr. Chriſtopher Wren's *Engin, deſigned for Grinding* Hyperbolical *Glaſſes. Some Inquiries concerning the Salt-ſprings at* Nantwich, *anſwered. An Extract of a Letter, concerning the Death of the Bigg-breaſted Woman, diſcourſed of in Numb.* 52. *An accompt of ſome Books:* I. *CERTAIN PHILOSOPHICAL ESSAYES, and other TRACTS by the Honorable ROBERT BOYLE: The Second edition, enlarged.* London; *printed for H. Herringman in the New-Exchange; A.* 1669. II. *DEL MOVIMENTO DELLA COMETA, apparſa A.* 1664: *Da PIETRO MARIA MUTOLI, in* Piſa, *in* 4°. III. *ERASMI BARTHOLINI de COMETIS A.* 1664. *& A.* 1665. *Opuſculum.* Hafniæ *in* 4°. IV. *SYLVA & POMONA, reprinted with Enlargements, by I. EUELYN. Eſquire &c.*

A Deſcription

Of Dr. Chriſtopher Wren's *Engin, deſigned for grinding Hyperbolical Glaſſes; as it was in a manner promiſed* Numb. 48. *p.* 962.

We ſhall give it in the Author's owne words, as followeth.

S*Int tria Corpora terendo idonea, P. Q. R; quorum P. & Q. ſint æqualia & Columnari forma, R vero Corpus Lenti-forme. P. rotetur circa axin A B; Q, circa C D; & R, circa E G.*

Sint autem A B & C D in diverſis Planis, ita tamen ut E G producta, ſit ad rectos *angulos vtrique A B & C D: accedant denique ad ſe invicem Corpora, prout opus fuerit, ſervata tamen eadem inclinatione & ſitu Axium.*

Dico, ex revolutione & mutua attritione Corporum prius poſitorum exurgere noua corpora Geometrica, quorum P & Q erunt Cylindroidea Hyperbolica *æqualia, R. vero* Conoides Hyperbolicum, *ſpecie & magnitudine datum.*

Demonſtrationem in promptu habemus, nec non Modulum ipſius Machinæ, terendis Lentibus Hyperbolicis deſtinatæ; quam operoſa pictura & prolixa explicatione deſcribere, mihi & artifici magis fuerit moleſtum, quam Dædalo *cuivis ſagaci ſimilem ad-invenire. Poſtquam enim expoſita jam ſunt principia Geometrica, facile erit conjicere, quale ſit Inſtrumentum; nempe, tres ſunt Tabulæ oblongæ, planæ, validæ, labiles, & ſibi invicem impoſitæ: Infima & Media ſuſtinent* inæqualia *Capitula (ſive Anſas mamphur ſuſtinentes) alternatim poſita; id poſtulat utriuſque mamphuris obliquitas & quaſi decuſſatio: Summæ Tabulæ* æqualia *ſunt Capitula in longum Tabulæ diſpoſita; & perforato citimo Capitulo mamphur tranſmittitur. Omitto rotas, rotulas, lora, pondera, cochleas, & reliqua ad motum expeditum & Machinæ firmitudinem neceſſaria. P pertinet ad infimam Tabulam; Q ad mediam; R, ad ſummam. R, Lens eſt vitrea: Q, Modulus Lentem terens; P, Formula Modulum corrigens; quæ, dum motu obliquo, & diverſo a motu tam Lentis quam Moduli, fertur, delet continuo & deterit, quicquid vitii imprimitur in Modulum ex Lentis & Materiæ attritione.*

Quare, cum adeo ſimplex & ſpontanea ſit iſta Hyperbolici Conoidis *genitura, ex ſolis nempe motibus Circularibus; cumque motus ſit duplex & varius, credibile eſt, Lentes* Hyperbolicas *ex hiſce Principiis vel nullis fore explicandas.*

Some Inquiries Concerning the Salt-Springs *and the Way of* Salt-making *at Nantwich in Cheſhire; Anſwer'd by the Learned and Obſerving* William Jackſon *Dr. of Phyſick.*

1. W*Hat is the depth of the Salt-ſprings?* The depths are various, in ſome places not above 3. or 4. yards. In our Town of *Nantwich*, the Pitt is full 7. yards from

the ſooting about the Pitt; which is gueſsed to be the natural height of the Ground, though the Bank be 6. foot higher, accidentally raiſed by rubbiſh of long making Salt, or *Walling*, as they call it, In other places the Springs lye much ſhallower; for in two places within our Townſhip the Springs break up ſo in the Meadows, as to frett away not only the graſs, but part of the earth, which lyes like a breach, at leaſt halfe a foot or more lower than the turfe of the Meadow, and hath a Salt liquor, ouſing, as it were, out of the mudd, but very gently.

2. *What kind of Country 'tis thereabout, where the Springs are, whither Hilly &c.*; *And what Plants grow near them?* Our Country is generally a low ground, witneſs the name given to it (*the Vale Royal of England*;) yet 'tis very full of Collicular Eminencies, and various Riſings, to diſtinguiſh it from being all Meadow. We have alſo a peculiar ſort of ground in this County and ſome adjacent parts, which we call *Moſses*; and they are a kind of Mooriſh boggy ground, very ſtringy, and fatt: which ſerveth us very well for Turfs, cutt out like great Bricks and dried in the Sun. And this kind of ground is ſo much here, that there are few Townſhips but they have their particular Moſſes. In theſe is found much of that Wood we call *Firr-wood*, which ſerves the Country-people for Candles, Fewel, and ſometimes for ſmall Timber-vſes; and this the Vulgar concludes to have layn there ſince the Flood. But generally theſe Moſſes ſeem to be places undermined by ſome Subterraneous ſtreams; or by the diſſolution of ſome matter, that made them equal with the reſt of the ground formerly: In which conjecture I am confirmed by this, That near a place of My Lord *Cholmondeley's*, called *Bilkely*, about 9. or 10. years ſince, not far from one of theſe Moſſes, without any Earth-quake, fell in, a piece of ground about 30. yards over, with an huge noiſe, and great Oakes growing on it fell with it together; which hung firſt with part of their heads out, afterwards ſuddenly ſunck down into the grounds, ſo as to become inviſible: Out of which Pitt they drew Brine with a pitcher tyed to a cart-rope, but could then find no bottom with the ropes they had there: Since, the Pitt is filled up with water, and now doth not taſte Salt, but a very little brackiſh, a very ſmall rindlet paſſing through it. The

neareſt Salt-ſprings to this place are at *Dartwich* about 3. miles from it, belonging to the preſent Lord *Keeper*, and My Lord *Cholmondeley*.

Some *Hills* we have, but no bigg ones, near our Springs; which generally lye all along the River *Weever*, as *Hankillow*, *Hatherton*, *Oſterſon*, *Bartherton*, *Nantwich*, *Weever*, *Leſtwich*, *Northwich*; yet there is an appearance of the ſame Veine at *Midlewich* nearer the River *Dane*, than *Weever*; which notwithſtanding ſeems not to be out of the Line of the *Weveriſh* ſtreame; and theſe lye all near Brooks, and in Medowiſh grounds.

As to *Plants*, I could obſerve no ſingularity at all; for, where the Salt reaches the ſurface, it frets away all (as I ſaid before,) and upon the Turfe near the old decayed Pitts grows the very ſame, that doth in the remoteſt place of the Meadow; only I obſerve, that, where the Turff was fretted away, *Ruſhes* maintain'd their ſtation longeſt; yet they grow alſo in other moiſt grounds, ſo that they are no friends to the Salt-ſprings, but I perceive, they reſiſt them beſt.

3. *Whether there be any Hot-ſprings near the Salt ones? And Whether the Water of the Salt-ſprings be hotter or cooler, than other Spring-water?* The Water of the Salt-ſprings here is very cold at the bottom of the Pitt, inſomuch that when the Briners ſometimes goe about to cleanſe the Pitt, they cannot abide in, above half an hour, and in that time they drink much Strong water.

There is not any Hot Springs (that I can hear of) nearer us, than *Buckſton*-well, which is about 30. miles diſtant near *Darby-Peak* Hills.

4. *Whether they find any Shells about thoſe Springs, and what kind of Earth it is?* I cannot hear of any Shells digged up, though of late ſeveral new Brine-ſprings have been both ſought, and found by ſinking deep Pitts; yet none knows of any Shels, but rather a blackiſh Slutch mixt with the Sand, which infects the whole Spring (like the Scuttle-fiſh) black, when 'tis ſtirr'd; elſe the water runs very clear.

5. *How ſtrong the Water is of Salt?* Springs are rich or poore in a double ſence; for a Spring may be rich in Salt, but poor in the

quantity of Brine it affords. Thus they have a rich Brine in their chief Pit at *Midle-wich*, which yields a full *fourth* part of Salt, like the rich *Burgundian* Springs, mentioned in *Kircher's Mundus Subterraneus*; yet this is ſo thrifty of its Brine, that the Inhabitants are limited to their proportions out of it, and their quantity is ſupply'd out of Pitts that afford a weaker Brine. Our Pitt at *Nantwich* yields but a *ſixth* part; but then 'tis ſo plentiful a Spring, that, whereas they ſeldome *Wall*, that is, make Salt, in above 6. Houſes at a time, and there are or ſhould be about 50. Wich-houſes in the Town; this Pitt is Judged ſufficient to ſupply them all: And this advantage would accrew over and above, that ſuch quick Uſe of the Pitt extreamly ſtrengthens the Brine, perhaps to a degree little leſs than that of *Middle-wich* Pitt: For, I have tryed it myſelf, that a quart of Brine, when the Pitt hath been drawn off 3. or 4. days firſt, to ſupply 5. or 6. Wich-houſes, hath yielded an Ounce and an halfe more of Salt, than at another time, when it hath had a reſt of a week or thereabout. But I conclude, that the neareſt conjecture, to be made of the ſtrength of this Brine, is, to yield *one* pound of Salt for *ſix* pounds of Brine; as I have ſeverall times tryed without any operation that might obſcure the working: By which proportion you ſee, that *ſix* Tuns of Brine yield *one* tun of Salt: which may be built upon; though in their ordinary way of working they make ſuch variety of Additions, that 'tis impoſſible for any to be confident of the Product.

To adde ſome particulars, concerning this point; I ſhall tell you, that *March* 8. 1668. I weighed *two* pounds of diſtilled water in a narrow-mouthed Glaſs-bottle, that I might make an exact marke for a quart. This Bottle, being fill'd with our Brine to the very ſame mark, weigh'd (beſides the tare of the Bottle) *two* pounds *three* ounces and *five* drachmes. This was taken up, when the Wich-houſes but began to work, ſo that the Pitt was but little drawn. I fill'd up the Bottle with the ſame Brine, and it weighed juſt three drachms more. This Brine, boyled away without any addition or clarification, made *five* ounces and *two* drachmes of Salt. Five days after, when the Pitt had been drawn all that while for the working of the Wich-houſes, vid. *March.* 13, the ſame Bottle, fill'd to the Quart-mark aforeſaid with Brine *then* taken up, weighed, beſide the Bottle, *two* pound *four* ounces and one drachme: the ſame time the Bottle, filled as in the former Experiment, weighed juſt *two* pounds and an *halfe*, which is three drachms more than the quart mark before; which boyl'd into Salt made *ſix* ounces *ſix* drachms and *two* ſcruples: which exceeds the former quantity of Salt, *one* ounce *four* drachms and *two* ſcruples, though the Brine exceeded the former in weight but *four* drachms.

By which Tryall I confuted alſo a Tradition, which the Briners have amongſt them, *viz.* That the Brine is ſtrongeſt at times of the Spring-Tydes, to wit, at the Full and Change of the Moon. For *March* 8th. aforeſaid was only one day paſt the Full, and then the Brine was weaker than it was the 13th day, when 'twas 6. days paſt the Full. So that I conclude, there could be no other reaſon, than that the much drawing makes way for the Salt-ſprings to come the quicker, and allows the leſs time for the admisſion of Freſh Springs.

6. *What is the Manner of their Work? or What Time of boyling the Salt-water? Whether they uſe any peculiar thing to make it granulate, and if ſo, What that is?* Their manner of working is this: They have formerly boyl'd their Brine in 6. Leaden pans with wood-fire; upon which accompt they all claime their intereſt in the Pitt by the name of ſo many *Six Leads Walling*; by which they each know their proportion; but in the memory of many alive they changed their 6. Leads into 4 Iron-pans, ſomething better than a yard ſquare, and about 6. inches deep, ſtill fitting the Content of theſe to that of the 6. Leads: and of late many have changed the 4 Iron-pans into two greater; and ſome *Wall* but in one: But ſtill the Rulers gage it to their Old proportions. Thus much ſeem'd neceſſary for underſtanding the ſeveral Operations.

They uſe for their Fewell, Pit-coals, brought out of *Staffordſhire*. Theſe Panns are ſet upon Iron-barrs, and made in, on all ſides, very cloſe (that the flame nor ſmoak break through) with clay and bricks. They firſt fill their Pans with Brine out of the Pitt; which coms to them in ſeveral Woodden Gutters: then they put into their Panns amongſt their Brine a certain mixture, made of about 20. Gallons of Brine, and 2. quarts of Calves Cows and chiefly Sheeps bloud, mixt into a Clarret-Colour: Of this mixture they put about 2. quarts into a Pann that holds about 360. quarts of Brine; this bloudy brine, at the firſt boyling of the Pann, brings up a ſcumm, which they are careful to take off with a Skimmer, made with a woodden handle thruſt through a long ſquare of Wainſcot-board, twice as bigg as a good ſquare trencher: this they call a *Loot*. Here they continue their fire as quick as they can, till halfe the Brine be waſted, and this they call *Boyling upon the freſh*. But when 'tis halfe boyled away, they fill their Panns again with new Brine out of the *Ship*, (ſo they call a great Ciſtern by their Panns ſides, into which their Brine runs through the Woodden Gutters from the Pump, that ſtands in the Pitt;) then they put into the Pann, 2. quarts of the Mixture following: They take a quart of Whites of Eggs, beat them throughly with as much Brine, till they are well broken; then mix them with 20. Gallons of brine, as before was done with the Bloud; and thus that which they call the *Whites* is made. As ſoon as this is in, they boyle ſharply, till the ſecond Scum ariſe; then they ſcum it off as before, and boyle very gently till it Corne; to procure which, when part of the Brine is waſted, they put into each Pann of the Content aforeſaid about a quarter of a pint of the beſt and ſtrongeſt Ale they can gett: this makes a momentany Ebullition, which is ſoon over, and then they abate their fires, yet not ſo but that they keep it boyling all over, though gently; for the Workmen ſay, that if they boyle faſt here, (which they call *Boyling on the Leach*, becauſe they uſually all this time lade in their Leach-brine, which is ſuch Brine, as runs from their ſalt, when 'tis taken up before it hardens) if I ſay, they boyle faſt here, it waſts their Salt. After all their Leach-Brine is in, they boyle gently, till a kind of Scum come on it like a thin Jce; which is the firſt appearance of the Salt: then that ſinks, and the Brine every where gathers into Cornes at the bottom to it, which they gently rake together with their *Loots*: I ſay, *gently*; for much ſtirring breakes the Corne. So they continue, till there is but very little brine left in the Pann; then with their *Loots* they take it up the Brine dropping from it and throw it into their *Barrows*, which are Caſes made with flat cleft wickers, in the ſhape almoſt of a Sugar-loaf, the bottom upper-moſt. When the Barrow is full, they let it ſtand ſo for an hour and an halfe in the Trough, where it drains out all the Leach-brine aboveſaid, then they remove it into their Hot-houſe behind their Works; made there by two Tunnels under their Panns, carried back for that purpoſe. The Leach-brine, that runs from the Barrows, they put into the next Boyling, for 'tis to their advantage, being ſalt melted, and wanting only hardning.

This work is perform'd in 2. hours in the ſmaller panns, which are ſhallower, and generally boyle their brine more away; wherefore their Salt will laſt better, though it does not granulate ſo well, becauſe, when the Brine is waſted, the fire and ſtirring breaks the Cornes. But this Salt weighs heavier, and melts not ſo ſoon; and therefore is bought by them, that carry it farr. But in the greater Panns, which are uſually deeper, they are above halfe an hour longer in boyling; but, becauſe they take their Salt out of their Brine, and only harden it in their Hot-houſe, 'tis apter to melt away in a moiſt Air: Yet of this ſort of Salt the bigger the grain is, the longer it endures; and generally this is the better granulated and the clearer, though the other be the whiter. Vpon which I rather think, 'tis the taking of the ſalt out of the Brine before it be waſted, that cauſes the granulating of it, than the Ale to which the Workmen impute it. This kind meaſures profitably well; therefore much bought by them that buy to ſell again.

They never cover their Panns at all, during the whole time of Boyling. They have their Houſes like Barns open up to the thatch with a Cover-hole or two, to vent the ſteam of the panns. Poſſibly Tiles may do better, but no body is yet ſo curious as to try, but the ſteam is ſuch, that I am confident, no plaiſter will ſtick, and boards will warp, and their nailes will ruſt ſo, as quickly to fret in pieces.

7. *Whether the Salt, made of theſe Springs be more or leſs apt to diſſolve in the Air, then other Salt? And whether it be as good to powder Beef or other Fleſh with, as French Salt?* This Queſtion I cannot well anſwer, in regard that *French* Salt coms not to us, to compare the efficacy of the one with the other experimentally; but this I can aſſure for our Salt, that with it both Beef and Bacon is very well preſerv'd ſweet and good a whole year together; and I do apprehend this Salt to be rather more ſearching than *French*

Salt,becauſe I have often obſerved, that meat kept with this Salt ſhall be more fiery Salt to the midſt of it, than I have obſerved, when I have eaten powder'd meat on Ship-board, which was probably done with *French* Salt, I then being on the South-ſide of England, and in a Dutch Veſſel. 'Tis certain, *Cheſhire* ſends yearly much Bacon to *London*, which never yet had any mark of infamy ſet upon it; and hanged Beef(which others call *Martin*-maſs-Beef) is as good and as frequent in *Cheſhire*, as in any place; ſo that I conclude, that this Salt is fully effectual for any Uſe, and as good as any other; and therefore hope, 'twill be proſecuted in the uſe, that ſo the Trade of our own Commodities may rather be advanced, than of forraign, eſpecially this of Salt; which if it ſhall pleaſe the *R. Society* to promote, they will lay an obligation on all our Country never to be forgotten.

Mean time,if I have related here any thing obſcurely or imperfectly, I am ready to anſwer any new Queries, that ſhall ariſe out of this obſcurity, or give larger ſatisfaction to any of the Old, that ſhall be thought hereby not ſufficiently explained.

Explication of the Figures belonging to the Accompt of Salt-making.

Fig. 1.

This is the Model of an Iron-pann of that proportion, when Four *are uſed in one houſe.*

a a. *The Eares to hang the Pann by upon the Brick-work.*

b. *The ſeveral Junctures of the Iron plates riveted.*

C C. *The breadth and length of the Pann near 4. foot.*

C d. *The depth of the ſides of the Pann, about 6. inches.*

Fig. 2.

a a. *The Hot-houſe between the Wall and the Chimney.*

b b. *The two Tunnels.*

CC. *The Chimney-back, into which the two Tunnels conveigh the ſmoake.*

d d d. d. *The four Panns.*

E. *The partition-wall between the Panns and the Hot-houſe.*

f. *The Fire-places.*

g g. *The Aſh-holes.*

h. *The Hearth below.*

i i. *The deſcent to the Hearth.*

Fig. 3.

The Back with his ſtale, with which they reach brine out of their Ship to fill their Panns withall.

Fig. 4.

a. b. *Several poſitions of their* Loots, *with which they skim,and gather their Salt.*

Fig. 5.

a.a. *Two* Barrows *newly filled with Salt; ſet into the Leach-trough to dripp out the Leach or Leack-brine,*

b b, *The Salt heaped above the Barrows and patted down hard.*

C. *The Leach-trough.*

Fig. 6.

A gutter, which they lay over from one Pann to another, to poure the Brine into the fartheſt panns.

An Extract of a Letter

Written to the Publiſher from Plymouth Novem. 2. *1669. by* William Durſton *Dr. of Phyſick; concerning the Death of the Bigg-breaſted Woman (diſcourſed of in* Numb. 52.*) together with what was thereupon obſerved in her Body.*

Sir,

I Thank you for yours, which by reaſon of my abſence came not to my hands till this day. *Elizabeth Travers* dyed on Thurſday night, *October* 21. The next morning I ſent for a Chirurgion, and ſome others to be preſent at the opening, and taking off of her Breaſts; though we only took off one, *viz.* the biggeſt, which was the left, and having weighed it, we found it of *Sixty four* pounds weight. Upon the opening of it, (which we made in ſeveral places) we could find neither Water, nor Cancerous humors, nor any thing vitious, more than the prodigious bigneſs; and the *Tubuli* and Parenchymous fleſh were purely white and ſolid, and no other than what we ſee in the ſoundeſt Breaſts of Women, or the beſt Udders of other Animals. She had loſt her ſtomach and reſt ſeverall weeks before, and made great complaints of her Breaſts from their great diſtenſion; and her whole Body was exceedingly emaciated. I have ſent you incloſed *one* meaſure, which was the *Breadth* of her two Breaſts (as ſhe was layd out on a Table being dead;) I mean, from the further end of the one to the other; which you'l find *three foot two Inches* and *an halfe*; and *another* meaſure, ſhewing the *Circumference* of the Breaſts *long*-wiſe, *viz. four foot*, and near *four* inches; and a *third*, giving the *Circumference* of the *Breadth*, *viz. three foot four inches* and *an halfe*.

The right Breaſt we took not off, but we gueſs, it weighed *fourty* pounds. I did ſome weeks ſince begin a Salivation with her, which leſſen'd her Breaſts in circumference ſome inches; but ſhe proving not conformable, I durſt not proceed to keep up the flux, but was forc'd to deſiſt. But ſhe was wonderfully revived afterwards for ſome time. She being weary of that courſe, I then cauſed a *Cauſtic* to be applyed; upon which the *Eſchar* falling off, yet nothing iſſued out of the Breaſt.

Then I cauſed an Inciſion-knife to be uſed, and made an Inciſion two inches and an halfe deep (ſuppoſing the Cauſtick had not wrought deep enough) but 'twas to no more purpoſe, than the former.

An Accompt of ſome Books.

I. *CERTAIN PHILOSOPHICAL ESSAYES, and other TRACTS, by the Honorable ROBERT BOYLE, Fellow of the R. Society. The Second Edition, enlarged.* London; *printed for* Henry Herringman *in the New Exchange. A. 1669.*

WE could not but give the Curious Reader notice of this reprinted and in divers places conſiderably enriched Book; but chiefly increaſed by the Addition of a very Philoſophical Diſcourſe about the *Abſolute Reſt in Bodies*, wherein the Noble Author, with his uſual modeſty as well as acuteneſs, delivers his Thoughts concerning the Inteſtin Motions of the Particles of *Quieſcent Solids*, and in doing ſo calls the *Abſolute Reſt* of Bodies in Queſtion, by undertaking to prove, That ſome of thoſe Bodies, which we think have their parts *moſt* at Reſt, are not exempted from having internal Motions in them; to which proof he Judgeth 'twill be conſequent, that it muſt be probable, that in other Bodies, whoſe Solidity is confeſſed inferiour, the component Particles are not in a State of *Perfect* Reſt.

II. *DEL MOVIMENTO DELLA COMETA, apparſa il meſe di Dicembre 1664. da PIETRO MARIA MUTOLI, in* Piſa, *in* 4°.

THis, and the next following Tract, (conſiſting each of a few ſheets only) ſhould ſooner have been taken notice of in theſe *Tranſactions*, if they had ſooner come to our

hands

hands. The Subject being Curious and weighty, it was thought fit to advertiſe the Inquiſitive Reader, though ſomewhat late, of what is diſcourſed upon it by other Learned men, beſides thoſe whom we have formerly noted.

This *Author* then doth principally diſcourſe of the Motion and Place of that Comet, and how its odd Appearances may be ſalved; and in regard that in ſuch a Diſcourſe of the Motion of a Body, ſeen in the Heavens, 'tis requiſite to ſuppoſe the Form and Conſtitution of the Celeſtial Bodies, and in what manner they make their Revolutions, He thought it requiſite, either to chooſe ſome or other of the moſt famous Hypotheſes concerning them, or elſe to endeavor to ſolve the *Phænomena* of this Comet, according to all thoſe Syſtems: Of which two Tasks he hath choſen the latter; in the proſecution whereof he ſeems ſatisfied, that the Comet of 1664. was above the *Moon*, it having been found without a ſenſible *Parallax*; for the obſerving of which, he ſhews an eaſie way, which needs no Quadrants or Sextants curiouſly made; nor a preciſe taking of the Meridian Altitudes; nor the Scituation of the Comet in the Zodiack; nor the noting of the preciſe time of the Obſervation; nor *laſtly*, needs to fear to be prejudiced by the Conſideration of the various Refractions; foraſmuch as he works not by the way of taking the ſeveral Altitudes from the Horizon, but by obſerving the Poſition of the Comet among ſome neighbouring Fixt Starrs: for the doing of which, he ſaith, he employed only a ſimple Thread ſtretch't out by an Arch, to make it evident, whether this Comet had a ſenſible *Parallax*, or no.

III ERAS-

III. ERASMI BARTHOLINI *de COMETIS An. 1664. & 1665. Opuſculum; Ex Obſervationibus Hafniæ habitis adornatum.* Hafniæ *in* 4°.

THis is the other Tract, we hinted in the next precedent Accompt; and in it the Author, having firſt intimated, That the more narrowly this Subject about *Comets* hath been ſearch't into, the farther have Intelligent and Perſpicacious men receded from the opinion of the *Peripateticks* concerning them; he acquaints the Reader, what Inſtruments he uſed in making Obſervations, among which was a Quadrant of 1½ foot *radius*; what conveniency he had as to the place of Obſervation; what Obſervations he made, *viz. A.* 1664. *Decemb.* 23. 24. 25. 26. 27. 28. 29. 30. 31. and *A.* 1665. *Januar.* 1. 3. 4. 5. 6. 7. 9. 12. 24. 31. and *Februar.* 7. Further, how he found the Longitude and Latitude of this Comet by obſerving its diſtances from two Fixt Starrs; and having found thoſe, how thence he found its right Aſcenſions and its Declinations for every day: Beſides, How he found the Motion of the Comet in his Orb, and the Place of Interſection and the Angle of Inclination with the Ecliptick. To which he adds his Conſiderations about the Place of the Comet, and the *Parallaxes*; vindicating here the Noble *Tycho* from the Accuſation of *Ricciolo* in *Almag. Novo*: Concluding all with an Inveſtigation of the *Cauſes* of Comets; where he examins, Whether Comets be co-eval with the World, or produced anew, and if the latter, How: Inſinuating withall, that, though he eſteems the latter Comet to be different from the former, yet, admitting the *Carteſian Hypotheſis*, we may without any difficulty maintain, that it was the ſame with the firſt.

IV. *SYLVA & POMONA, by* JOHN EVELYN *Eſq. Fellow of the R. SOCIETY.* Reprinted by *John Martin* and *James Alleſtry in fol. London.*

THis is the *Second* Edition of this Book, very much improv'd and enlarged. It was the firſt that was written and publiſht by the expreſs Order of the *R. Society*, who thought it fit to begin with a ſpecial Sollicitation for the good Culture of our own Native Country, that it might be a leading Example to all our Neighbours, and as far as their Inſtructions are received.

In *Sylva* our Author provides and directs for ſound *Timber*, and ſtore of the beſt *Fuell* in Forreſts, Woods, and Groves. *Timber* is the ſtrength and walls of this Kingdom; and is ſerviceable for many Domeſtick uſes, and curious Utenſils; and to advance the Richeſs and Accommodations, not only of our own Country, but alſo of all Forrain parts, as far as may mutually oblige each other by Navigation and Commerce.

And together with his *Majeſties* great Example, *Pomona* hath already encourag'd the Plantation of many hundreds of Nurſeries, or Orchards in *England*, which by this time begin to reward the induſtrious Owners with a ſalubrious Liquor, perhaps more agreeable to our Engliſh Temperament, than the Grapes of ſome Countries do afford; and, if well choſen, more gentle, and more pleaſing to the palat, than many ſorts of French Wines without Sugar; and yet requiring much leſs labour, leſs artifice, and fewer hands for the yearly culture.

This Worthy perſon hath alſo given us (under a modeſt veil) an Inſtructive Touch for *Vineyards in England* (of which ſee *Numb.* 15. *p* 262.) And for the behoof of his own Country hath condeſcended to furniſh us with accurate Tranſlations of the *French Gardiner*; and of the beſt Writers of *Architecture*, and of the *Idea of the perfection of Painting* (of which laſt ſee *Numb.* 39. *p.* 784.)

Of his own Collections, he hath given us an elegant Hiſtory of *Sculpture*, and of Engraving in Copper, and the curious Arts thereunto belonging: In which the moſt excellent Painters of this Age may ſee themſelves either duly celebrated, or directed for the beſt, and aſſiſted, or at leaſt encourag'd.

And (beſides other Treatiſes, which are *Anonymous*, as being of a reſerv'd nature, but are nevertheleſs entirely for the honor of the King and this Kingdom, and generally for the good of all Men;) He hath lately made two conſiderable Excurſions: In *one* of which Tracts, for a Caution to all future Ages, and to denote the general aptneſs of Mankind to be deluded and deceived, he hath publiſht a well-grounded Hiſtory of the *Three late famous Impoſtures*; the *firſt*, meerly Caſual and innocent, in *Padre Ottomanno*; the *ſecond*, bold and impudent, in *Mahomet Bei*; the *third*, a confident Cheat, in *Sabatai Sevi*, the Jews Counterfeit Meſſias: In the *other* Tract, *Publick Employment and an Active Life* are *preferr'd to Solitude*.

Thus He, and other Generous perſons, can in the crowd of public buſineſs, find, or make leiſure to oblige all men; whilſt *Moroſe Schoolmen*, and *Narrow Criticks*, make it their main buſineſs to outgoe Satan in their falſe Accuſations, diſingenuous Surmiſes, and immodeſt Diſturbances of the nobleſt endeavors and atchievments.

But thrice happy were all *England*, if every where, with united minds and affections we were as heartily inclin'd, and as active to cultivate this our kind Soil for an *Elyſium*, as this Liberal Author is now buſie and preparing for the Preſs another more Auguſt and Noble Work, bearing the Title of *Englands Elyſium*. This was the Method of the Great Creator: He planted the *firſt Paradiſe* for an Entertainment of Innocent Man; and introduced the firſt Lectures of *Experimental Philoſophy* upon Animals and Vegetables. And again, when Gods peculiar People after the Conqueſt of their Enemies, were firſt eſtabliſht in peace and proſperity, their *Philoſophical* Monarch was inſpired with the ſublimeſt Wiſdom, not only for the Building of a Glorious Temple in the Holy City, but alſo for the Culture of the Land of Promiſe with the Plantations of Gardens and Orchards; and for the Experimental knowledge of all Vegetables. And thus alſo, as modern Princes may laudably follow the greateſt Examples of all foregoing ages, his *Majeſtie* immediately after his Reſtauration, made it his firſt work to Recover the Church to its Primitiue Faith and Order: Thence he proceeded, *to* promote the ſeveral Branches of the Antient Wiſdom; the knowledge both of *Nature*, by the proper Teſt of Gods own Works; and of all Excellent *Arts*, Medical, Chymical, Mathematical, and Mechanical; Architecture Naval, Civil and Military, for the ſtrengthening of his Royal Navy, the repairing of his Palaces, and the rebuilding of our Chief City incomparably fairer and ſafer than ever it was : *To* ſend out his Fleets, for a ſpecial countenance of Trade, and at the ſame time for a ſatisfaction to many conſiderable Philoſophical Inquiries in moſt parts of the World : *To* ſtrengthen his remoteſt Dominions; and *to* ſecure and cultivate his American Colonies, for the Silk-trade, and the growth of ſuch beneficial Vegetables, as thoſe ſeveral Soils in ſeveral diſtant Climats will bear; Not intermitting thoſe elegant Ingenuities of beautifying his Coyn with the faireſt and really Gardian-ſtamps; and of ſtoring his Cabinets with the Curioſities and Rarities of Art and Nature, for the encouragement of Sculpture, Picture, and of no ſmall number of Artificial Practices and uſefull Inventions. To be ſhort, his Majeſty ſoon gave to all the Kingdom, in *St. James*'s *Park*, and *Hide Park*, in the Approches to his faireſt Palaces, and in his Forreſts, Illuſtrious Patterns for the beſt Improvements, and for a copious Variety of all kinds of Amænities. Now when our idle Multitudes ſhall be ſtrongly inured to thoſe innocent and profitable Employments, till all our *Hills*, which are now bald, ſhall be ſhelter'd with the Cheſnut, the Beech, the Pine, Box, Maple, and the Royal Oak; and all our *Valleys* adorn'd with the fruitful Knots of *Cyrus*, and like the golden Gardens of *Alcinous*; then ſhall we have fair grounds to hope for the bleſſings of Peace and Plenty, and the Juncture of ſound and uſefull Philoſophy with Chriſtian Charity; and of true Religion and Piety with cheerful Loyalty; and then we ſhall truly deſerve the Old Style of the *Fortunate Iſlands*, and the *Gardens of Heſperides*.

ERRATA in Numb. 52.

Page 1048. l. 32. r. 35. pounds. p. 1055. l. 34. r. 231. for 281.

Printed by T. N. for *John Martin*, Printer to the
Royal Society, and are to be ſold at the Bell
a little within *Temple-Bar*. 1669.

PHILOSOPHICAL TRANSACTIONS.

December 13. 1669.

The Contents.

The Extracts of Two Letters, one written from Paris *concerning ſome Tranſactions there, relating to the* Tranſfuſion of Blood; *the other, from* Plimouth, *giving an Accompt of the hindrance of opening the Big-breaſted Woman after her death. An Appendix to the former Diſcourſe of the* Salt-Work. *A Relation, touching the Quick-ſilver-Mines in* Friuli, *confirming and enlarging the Accompt formerly given of the ſame. A Narrative of an odd Lake in* Carniola. *An Accompt of ſome Books: I. MECHANICA, ſive de MOTU Tractatus Geometricus, A.* Joh. Wallis *SS. Th. D.* &c. II. *NATH. HIGHMORI de Hyſterica & Hypochondriaca Paſſione Reſponſio Epiſtolaris ad Doct.* Willis. III. *NOUVELLES EXPERIENCES ſur la VIPERE, par M. CHARAS.* IV. *ATHANASII KIRCHERI ARS COMBINATORIA.* V. *THEODORI KERCKRINGII M. D. Spicilegium Anatomicum, nec non* Oſteogenia *Fætuum.*

A Letter

Written by an Intelligent and Worthy Engliſh Man from Paris, *to a Conſiderable Member of the* R. Society *in* London, *concerning ſome Tranſactions there, relating to the Experiment of the Transfuſion of Blood.*

SIR,

YOu have ſuch a Relation to the *Royal Society*, that I think my ſelf obliged to impart unto you the Honourable mention, I heard of that Noble Inſtitution in the *Grand Chambre* of the Parlement here, on Thurſday laſt, that Society being then publickly inſtanc'd in for the *Source of Noble Experiments*, and having the Precedency of thoſe in *Germany*, *Italy*, and other places of *Europe*; in that order, wherein the Orator thought fit to rank them.

The Occaſion of mentioning it was, That one Monſieur *Denys*, a Phyſitian, had been queſtion'd before the *Lieutenant Criminel* here for the Death of his Patient (a Man that had been ſtark Mad for ſeveral years) who had expired under his hands, while he was Transfuſing Blood into him, according to the New Experiment. The Operation had been twice perform'd with good ſucceſs; the Patient having had thereupon a good interval of two Moneths after the firſt, and all hopes of a longer after the ſecond, had it not been for the debauches in Wine and Brandy, that he fell to, ſoon after the Operation. He was a *Brittan* by birth, and the Original of his Madneſs, Love. That which Mr. *Denys*, his Advocate, very much gloried in, was, that (beſides that the Experiment had been practiſed with good, at leaſt with no ill, ſucceſs, in *England*, *Germany*, *Italy*, *Holland*, &c. and defended in *Theſes* in almoſt all the Univerſities of *France*) there were two perſons, a Man and a Woman, preſent in the Audience, that received a benefit to Admiration from the Experiment, after they had been abandon'd by all Phyſitians and other helps.

In Juſtifying the Introduction and Uſe of New Experiments he ſaid, That the *Moſt precious Life to this State* (viz That of his *Moſt Chriſtian Majeſty*) had been ſaved by the Adminiſtration of a lately invented *Emetique*.

This Advocat was the Son of Monſieur *le Premier Preſident de la Moignon*. The ſame was, not long ſince, in our Court, and is, I perceive, well known to it, and infinitely ſatisfied with the Civilities he had received from ſeveral perſons there. Though this was his firſt Action, yet his performance was a Maſter-piece, and he had an Audience ſutable; all Friends, I ſuppoſe, to his Family: among them were the Duke of *Enguyen*, the Dukes of *Luynes*, *Mortemar*, *Chaulne*, and a World of other Great Perſons, Men and Women.

The Pleading for the Widow Plaintiff will be on Thurſday next; but any odds would be laid on the Defendants ſide; though ſome partial Men here are more than ſuſpected to ſet on the Widow. Pardon, Sir, this Interruption, and believe me,

Yours, &c.

Paris, Nov. 30. 1669.

An Extract of a Letter

Written by Dr. Durſton *from Plymouth* Novemb. 28. *1669. giving an Account, why the late Big-breaſted Woman was not open'd after her Death.*

SIR, It was deſign'd to have examin'd the *Viſcera* of *Eliz. Travers*, but her Aunt, who was with her and took care of her, fell into ſuch a paſſion upon the propoſal of opening her, that ſhe ſeem'd to be for the time beſides her ſelf; and I could not by any art get her out of the Chamber, where the Corps was laid out, till ſhe ſaw her nail'd up in her Coffin. I never ſaw ſuch fondneſs ſhewn to a dead Body; and I was ſufficiently troubled to be thus diſappointed by a fond extravagant Woman: But yet I believe, if I had examin'd the Entralls, I ſhould have ſeen little or nothing extraordinary. For, to the laſt, I could perceive no ill ſmell from her Breath, or ſtreightneſs upon the Cheſt, or painfulneſs in her Breathing; and the *Egeſta per urinam*, &c. were well enough. If any thing worth Obſervation do further occurr in theſe parts, I ſhall upon every opportunity communicate it to you, who am, *&c.*

An Appendix

To the Diſcourſe concerning the Salt-work, publiſht in Numb. 53. *communicated by the ſame Doctor* Jackſon, *in a Letter of* Novemb. 20. 1669.

Qu. 1. *Whether thoſe Salt-ſprings do yield leſs water and more of the Salt, in great Droughts, than in wet ſeaſons?* *Ans.* Our Springs do not ſenſibly alter in their decreaſe or increaſe in either dry or wet ſeaſons; for, being plentiful Springs, we have alwayes the Pitt full: Only this is obſerv'd by the *Briners*, that they make more Salt with the ſame quantity of Brine

in

in dry, than in wet ſeaſons; and more Salt of the ſame quantity of Brine at the Full of the Moon, than at any other time.

2. *How long before the Spring, or in the Spring, it may be, before the Fountains break out into their fulleſt ſources?* *An.* 'Tis not obſervable at all in our Salt-ſprings, that the Brine riſeth more plentifully in the Spring-time, than at any other ſeaſon of the year: neither is there any ſenſible difference in the quickneſs of the ſources as to the times of the day.

3. *How much Water the Spring yields daily, or in an hour, ordinarily, or in great Droughts?* *An.* Our Pitt is about 5 yards ſquare or better, and of ſo plentiful a ſource, that I believe, it cannot be gueſſed; and the rather, becauſe it ſeems not to run much, when 'tis permitted to come at its full guage, where a vent through the bank into the River is; but being drawn much, ſo as to ſink it below its uſual guage, it ſo plentifully lets in, that 'twill ſerve all the houſes in the Town to work, without falling much lower than a yard or two at moſt: ſo that I believe, that, when 'tis full, its own weight ballances much the influx of the Springs, which are much quicker in a low Pitt, than a full one.

4. *At what diſtance the two richeſt Springs,* of *Nantwich and Droitwich are from the Sea?* *An.* That of *Nantwich* is from the Sea but 30 Miles. *Droit-wich,* being in *Worceſterſhire,* is not known to me.

5. *How near the foot of an Hill is to thoſe Springs; and what height the next Hill is of?* *An.* The neareſt Hill (of thoſe, that are worth calling Hills) to our Springs is about 7 Miles diſtant from them: the Hill ſteeper, but not much higher, than High-Gate Hill.

6. *Wherein conſiſt the Diſtinctions of thoſe ſorts of Salt, which are called Catts of Salt, and Loaves of Salt?* *An.* As *White* Salt is that, deliver'd in my former diſcourſe, and *Gray* Salt the ſweepings of ſuch Salt, as is conſtantly ſhed and ſcatter'd about on the floore without taking much of the Dirt, which occaſions its grayneſs (which ſells not at half the rate of the *White* Salt, and is only bought up by the poorer ſort of People, and ſerves them in ſalting Bacon, courſe Cheeſe, *&c.*) So *Cats* of Salt are only made of the worſt of Salt, when yet wettiſh from the Panns;

molded and intermixt with interſpers'd Cummin-Seed and Aſhes, and ſo baked into an hard lump in the mouths of their Ovens. The uſe of theſe is only for *Pigeon*-houſes: But *Loaves* of Salt are the fineſt of all for Trencher-uſe. No difference in the boyling of theſe from the common way of the fine Salt; but in the making up ſome care is uſed: for firſt they cut their Barrows, they intend for Salt-loaves, with a long ſlit from top to bottom equally on both ſides; then they tye both ſides together with cords; then fill this Barrow with Salt boiled as uſually, but in the filling are careful to ramm down the Salt with the end of ſome wooden bar, continuing this, till the Barrow be fill'd to their minds; then place it ſpeedily in their Hot-houſe, and there let it ſtand all the time of their *Walling*: wherefore they prepare for theſe Loaves at the beginning of their Work, that they may have all the benefit of their Hot-houſes; and when theſe begin to ſlack, they take out the Loaves, and untye the cords, that faſtned the Barrow, that both ſides of the ſame may eaſily open without breaking the Loaf. Then they take the Loaf, and bake it in an Oven where houſhold-bread hath been baked, but new drawn forth. This they do twice or thrice, till they ſee it baked firm enough; and this being plac'd in a Stove or in a Chimny corner, and cloſe cover'd with an Hoſe of Cloth or Leather, like the Sugar-Loaf-papers, will keep very white, and when they have occaſion to uſe any, they ſhave it off with a knife (as you do Loaf-Sugar) to fill the Salt-ſeller.

I muſt not omit telling you, that all the ground, where Salt or Brine is ſpilt, is, when dugg up, excellent *Muck* for Grazing Ground; and even the Bricks, that are throughly tinged with it, are very good Muck, and will diſſolve with other Muck, and fertilize Land conſiderably (eſpecially Grazing ground) for at leaſt four years; but of this I ſhall perhaps take occaſion to ſay more in my Anſwers to your *Queries* of *Agriculture*.

A Relation *Concerning the* Quick-ſilver *Mines in* Friuli; *communicated by* *Dr.* Edward Brown; *confirming as well the Accompt formerly given of that ſubject, in* Numb. 2. *of theſe* Tranſactions, *as enlarging the ſame with ſome Additions.*

THe Town of *Idria,* in the County of *Goritia* and Province of *Friuli*, is ſeated low, and encompaſs'd with Hills on all ſides. A River of the ſame name runs by it, which although *Leandro* terms it *ſuperbisſimo fiume d' Idria*, yet I found ſmall and ſhallow at the time when I was there; though upon plentiful Raine it proves ſufficient to convey down the Firr-Trees and other Wood required in the building of the Mines, and alſo for Fuel required in the ſervice of them: And to this end there is an handſome work of Piles made ſloaping athwart the River (after the ſame manner as I obſerv'd in *Newſol* in upper *Hungary* croſs the River *Gran*;) to ſtop the Trees, which are cut down, and caſt into the River above this place.

What is chiefly conſiderable in this Town, are the *Quickſilver*-Mines, very well known to the Neighbouring parts, and exceeding uſeful to many at greater diſtance.

The entrance into theſe Mines is not high, or upon an Hill, as in many other Mines; but in the Town it ſelf, whereby they are ſomewhat the more troubled with Water, againſt which they are provided with many excellent Engins and Devices, as at other deep Mines. The deepeſt part of the Mine from the entrance, is between 120 and 130 fathoms.

Of the Quick-ſilver of this Mine they make two ſorts: The one they call *Iungfraw*, that is, *Virgin*-Quickſilver; the other, *plain* Quickſilver. *Virgin*-Mercury they call that, which diſcovers it ſelf without the help of Fire; and is either plainly to be ſeen in the Ore, or falls down in little drops in the Mine, and ſometimes ſtreams out in good quantity; as about ſeven years agoe it ran out of the Earth at firſt in a ſtreame as ſmall as a thred, and afterwards as big as a pack-thred, but ceas'd in three or four dayes.

That alſo is accounted *Virgin*-Quickſilver, which, having no need to paſs the fire, is ſeparated by water firſt in a Sive, and afterwards in a long trough, having very ſmall holes at one end. So that there are in a manner two ſorts of *Virgin*-Mercury: one, running out and diſcovering itſelf without labour; ther, requiring ſome way of Extraction and ſeparation, thoug not ſo high an one, as by Fire.

Plaine Quickſilver they name that, which is not at firſt perceived by the Eye, or falls from the Ore, but is forc'd out by Fire. And this they obtaine out of the Ore, or out of the Cinnaber of Mercury, which they digg out of this Mine. The Ore of this Mine is of a dark colour, mix'd with red. But the beſt is an hard ſtone; which they commit not preſently to the operation of the Fire, but powder it groſsly, and work it by the Sive; that ſo, if any *Virgin*-quickſilver be found in it, it may be ſeparated in this manner, and what doth not paſs the Sive, may be ſeparated by Fire in Iron-furnaces; Fifty of them in a Fire.

The Quickſilver-ore of this Mine is the richeſt of all Ores, I have yet ſeen; for ordinarily it contains in it *halfe* Quickſilver, and in two parts of Ore one part of Quickſilver, and ſometimes in 3. parts of Ore, two parts of Quickſilver.

I went into the Mine by the Pitt of St. *Agatha*, and came up again by that of St *Barbara*, deſcending and aſcending by Ladders. I aſcended at one of 639. ſtaves or 89. fathoms. *Andreas Siſerus*, in *Kircher's Mund. Subterraneus*, makes ſuch a dreadful deſcription of this Mine, that it might diſcourage any from attempting the deſcent; which makes me doubt, Whether he had been in any other Mine, eſpecially where the deſcent is made by Ladders.

This Mine, I was inform'd, hath been wrought 200. years, about the ſame ſpace of time with *Newſol*-Mine, but coms much ſhort in time of the Silver-mine at *Schemnitz*; and much ſhorter yet of the notable *Lead-mines* in upper *Carinthia*. Some hundreds of men are employed about this Mine of *Idria*; of which the chief Officers are the Prefect, the Controller, and the Judge.

I heard no complaint of the *Damps* of this Mine, as I have heard of divers others; Yet the workmen are ſufficiently miſchiev'd without them: for, though they be not ſuddenly ſuffocated, yet the Mercury getting into their Bodies, they are languiſhingly deſtroyed by it. Much leſs could I hear any news of either noxious or innocent Apparitions, *Virunculi* &c. ſuch as ſome write, and many talk of in other Mines.

In a Laboratory, where the Quickſilver is ſeparated by Fire, I ſaw an heap of 16000. Retorts of Iron; every one of which coſts a Crown at the beſt hand from the Iron-furnaces in *Carinthia.* There are 800. Retorts and as many Recipients employ'd together, in drawing over the Quickſilver in 16. Furnaces; 50. in each Furnace, 25. of a ſide, 12. above, and 13. below of each ſide.

June 12, when I was there, they carried out 40. *Saumes* of Quickſilver into forrain parts, each *Saume* containing 315. pound weight, to the value of 400 ducats of Gold. Though the conveyance be not eaſy, yet ſome is ſent as farr as *Cremnitz* in *Hungary*, for the uſe of the Gold-mines; and very much carried away Southward. For, though the River by the Town be but ſmall, yet they are not very farr from the *Sontius* or *Lyſonzo*, a conſiderable River, which runs into the Gulf of *Trieſte* in the *Adriatick* Sea.

In the Caſtle I ſaw 3000 *Saumes* of Quickſilver together, in barrels; the Quickſilver being firſt made up in double leather: And in another houſe as much rich Ore, as can be diſtill'd in 2. years, except they have great plenty of rain to bring down the wood; but, the Hills being high about them, it ſnows at the tops of them oftner than it rains.

The Countrys, through which I paſs'd, are ſingularly well wooded, and well ſtor'd with fair Trees, wherein, beſide ſuch as grow with us in England, are ſtately *Firrs*, *Larches*, *Pines*, *Pinaſters*, *Picea*'s, and that nobly criſped and well grain'd kind of *Acer*, whereof *Viols* and *Violins* are made: Whereof there is alſo plenty in the Country of *Saltzburg* and *Carinthia.*

Travelling ſometimes in the night, we had continually about us a great number of large *Glow-worms*, which put into papers gave a dimm light like Candles in Lanthorns; and the Aire alſo full of *flaming Flyes*, affording ſome delight to us.

The way unto this place I found difficult; for, travelling from places on the borders of *Croatia* by *Lovitch*, I was faine to paſs over great mountains, and coming from it, I paſs'd over *Swartzenberg* or the Black mountain, from whence I deſcended 10. miles in a rocky Country, and farr more ſtony than the *Crau* or *Campus lapidoſus* in *Provence*; and ſo to *Aidoſchini* and *Goritia*, and leaving the *Sclavonian* behind, entred into the *Lingua Fullana*, and ſo on to this Noble and incomparably fortified City; where being yet uncertain, whether I ſhould go to *Venice*, I would not omit to preſent you this accompt, which I beſeech you to accept from *&c.*

Palma nova in *Friuli* June 15. *1669.*

An Accompt from the ſame Dr. Brown *Concerning an Vn-common Lake, called the* Zirchnitzer-Sea, *in* Carniola.

HAving croſs'd the River *Dravus*, and paſs'd Mount *Luibel* in the *Carnick Alpes*, by that noble paſſage, cut through the Rooks, and vaulted like that of *Pauſilype* near *Naples*, I had a deſire to take a view of the *Lake* of *Zirchnitz*, ſo much ſpoken of, and written on by ſo few; and therefore I went unto *Crainburg* upon the River *Savus*, and ſo to *Labach*, the chief City of *Carniola*; from whence I continued my Journey in *Carniola* betwixt the Hills and a great Marſh, till I came to *Brounizza*, two leagues from whence and beyond the Hills is ſeated the ſaid Lake, receiving that name from *Zirchnitz*, a town of about 300. houſes.

This Lake is near two German Miles long, and one broad. On the South-ſide thereof lyes a great Forreſt, wherein are many Deer, and wild Boares, Wolves and Bears. On the North ſide the Country is flat; but the whole Valley is encompaſſed with Hills, at ſome diſtance from it.

This Lake is well fill'd with Water for the greateſt part of the Year; but in the Month of *June* it ſinketh under ground, not only by percolation or falling through the pores of the Earth, but retireth under ground, through many great holes at the bottom of it: And in the Month of *September* it returns by the ſame, and ſo in a very ſhort time fills up the Valley again.

As the time of the waters Deſcent is ſhort, eſpecially when the Lake grows lower, and hath for a while ſhewed ſome abatement, ſo the Aſcent and return is ſpeedy; for at theſe holes it mounteth with ſuch violence, that it ſprings out of the ground to the height of a pike, and ſoon covers the tract of Earth again.

And this piece of ground in the time of the retirement and abſence of the Water is not unfruitful, but by a ſpeedy and plentiful production of Graſs yieldeth not only a preſent ſuſtenance for the beaſts of the field, but a good proviſion of hay for the cattle in the winter.

Nor have the Inhabitants thereabout only the benefit of the ground by theſe Commodities, but alſo the recreation and profit by Hunting. For at the time of the waters abſence, Hares, Deer, Boares and other Animals come into it out of the neighbouring Forreſt and Country, and are taken ſeveral wayes by them.

The Lake is not only thus fill'd with water, but every year well ſtored with Fiſh. The Prince of *Eckenberg* is Lord of it and of much Country thereabout: But upon reſtoring of the waters all have liberty to Fiſh; and the fiſhermen, ſtanding up to the waſt at the holes before-mentioned, intercept the paſſage of the Fiſh, and take a very great number of them, which otherwiſe would be ſecure for ſome Months under the Earth, and not fail to return in *September*.

The Fiſh of this Lake have a cloſer habitation than thoſe of any other I know; for, they paſs ſome Months under the Earth, and a good part of the Winter under Ice. I could not learn, that there were any *Otters* in this Lake, (which otherwiſe muſt probably have taken the ſame Courſe with the fiſh;) nor that there were any remarkable extraneous ſubſtances, any Vegetables, or unknown Fiſhes brought up by the water, but thoſe which come up are of the ſame kind with thoſe which deſcended.

But beſide theſe holes at the bottom of the Lake (of which there are many,) there are alſo divers Caverns and deep places in the Country of *Carniola*, even where there is no water; after the like manner as we have in the *Peack-country*, and at *Elden-hole* in *England*.

Halfe an Engliſh mile nearer the Lake than the town of *Zirchnitz*, ſtands a village named *Seadorf*, and neigher to the Lake than this, another village called *Niderdorf*: between theſe two there are Corn-fields; yet ſometimes theſe lands are alſo drown'd; and 'tis conceived, that there are divers ſubterraneous Caverns under them: for, it happens ſometimes at *Niderdorf*, that the ground ſinks in ſeveral places upon the ſudden retiring of the Lake; and the aforeſaid Prince of *Eckenberg* was once ſo curious, as to deſcend into one hole, through which he paſſed under an Hill, and came out on the other ſide; as I was informed by Monſieur *Andreas Wiſer* the preſent Judg of Zirchnitz, and alſo by *Johanes Wiſer*, who hath formerly held the ſame place.

The people, who are acquainted with the Lake, wet and dry, know where they are, and have a particular knowledge of the eminencies, vallies and inequalities of it: for, the bottom of the Lake is not even, or near about the ſame depth, but ſometimes two foot, and then ſuddenly twenty yards deep. And becauſe the Fiſh haunt the deep places more than the ſhallows; they have given names to the 7. chiefeſt cavities or valleys in the Lake.

I took boat at *Niderdorf*, and went divers miles on the Lake, paſſing over the five firſt valleys. I went alſo to a noted Stone, commonly called the Fiſhers-ſtone, which hath ſomewhat of the uſe of the *Nileſcope-pillar* at *Grand Cairo*; for by a certain appearance of that, they conjecture how ſoon the Lake will retire. I alſo paſſed by a noted Hill, which, when the Lake is high, becomes a pleaſant iſland; and ſo I returned, *&c.*

Venice June 20, 1669.

An Accompt of ſome Books.

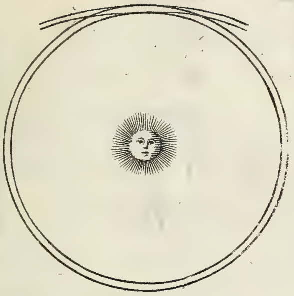
I. *MECHANICA*, *ſive de* MOTU *Tractatus Geometricus. Auth.* Joh. Wallis *SS. Th. D. & Geom.* Profeſſ. *Saviliano*, *&c.* Londini; *Impenſis* Moſis Pit, *in Vico vocato* Little Britain, 1670. *in Quarto.*

THis Excellent Mathematician, having compoſed a Learned Treatiſe concerning the Doctrine of *Motion*, and what thereon depends, managing it in a manner altogether *Geometrical*, was pleaſed, upon the importunity of his Friends, to permit the *Firſt Part* thereof to come abroad, whileſt the others are ſtill in the Printers hands; which is about One third part of what he did, near two years ſince, impart to the *R. Society*, and was by them deſired to make it publick. In this Firſt Part he delivers,

1. The *General Rules of Motion*, promiſing thereto, as becomes a ſtrict Reaſoner and good Geometrician, the *Definitions* belonging to that Subject; and then compriſing the *Rules* themſelves in Thirty Propoſitions: In which he takes occaſion, among many other weighty particulars, to intimate, That it is principally the buſineſs of a *Mechanician*, to excogitate and make practicable ſuch Engins, to be interpoſed between the *Strength* and the *Weight*, as may ſo moderate the *Celerity* of *Motion*, as to compenſate the *Greatneſs* of the *Weight*, by the *Slowneſs* of the *Motion*,

Tab. 2. N°. 60.

I



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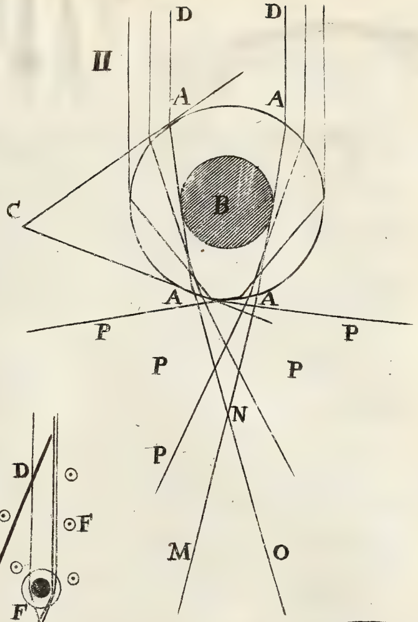

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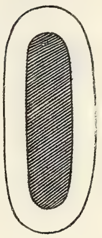

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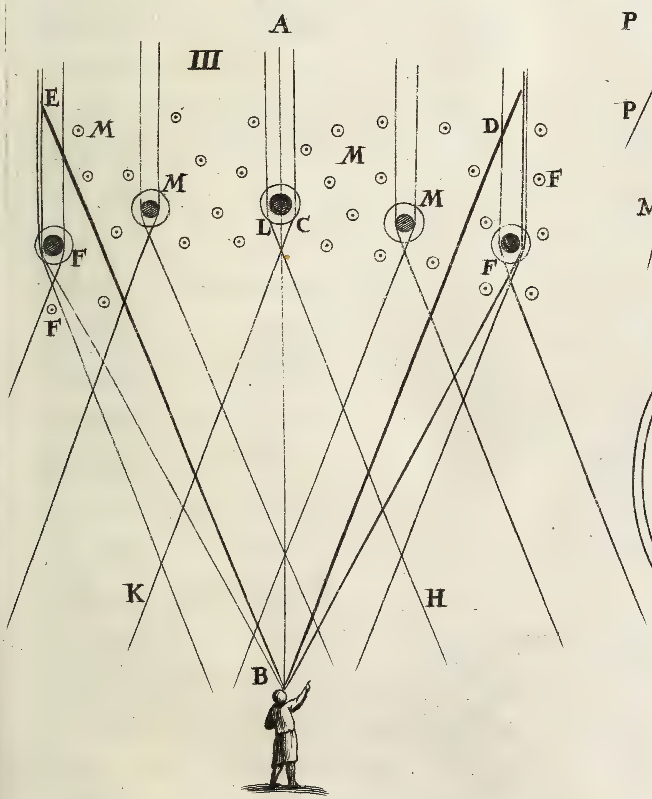

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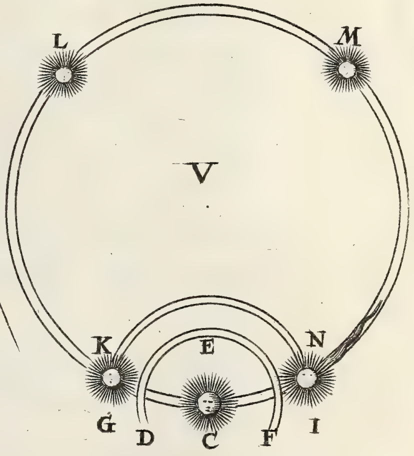

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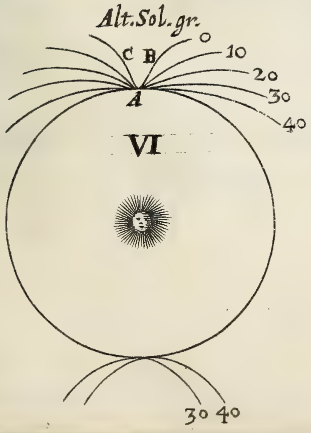

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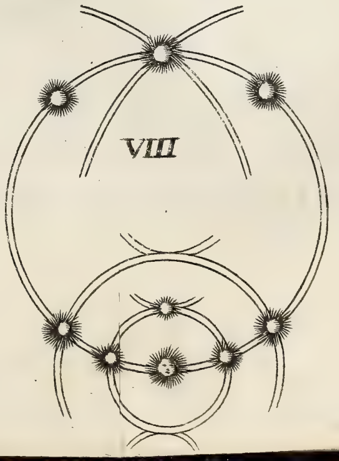
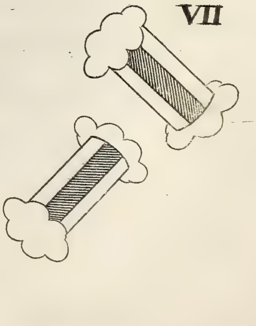


VII



An Accompt of ſome Books.

BRITISH MUSEUM NATURAL HISTORY

Motion, or the *want* of *ſtrength*, by the *length* of *time*.

2. Of the *Deſcent of Heavy Bodies, and the Declivity of Motion*, Thirty four Propoſitions. In which he doth not think fit to explicate the *Phyſical Cauſe* of *Gravity*, whether it proceed from an innate quality in the Heavy Body it ſelf; or an Univerſal Tendency of Circum-ambient Bodies to the Center, or a Magnetical Power in the Earth, or the like; but contents himſelf (his purpoſe requiring no more) to underſtand by the word *Gravity*, that ſenſible force of moving downwards, or to a certain Point, both the Heavy Body it ſelf, and the leſs powerful Impediments: Shewing in this Part alſo, in what proportion the different Declivities of Oblique or Sloping Plains, in which a Heavy Body is ſuppoſed to be moved, doth operate to the Helping or Hindering of ſuch Motion. All which he delivers as generally applicable to Motions, produced by any other force, as well as that of *Gravity*; and directed any other way as well as downward.

3. The Doctrine of the *Libra*, or *Ballance* (containing the Fundamental Principles of all *Staticks*;) in Twenty five Propoſitions; among which, he explains the Geometrical Conſiderations requiſite in making both exact *Common* Scales, and the *Roman Statera*.

On this of the *Libra*, depends (that which is the ſubject of the next Part, almoſt finiſht at the Preſs) the whole Doctrine of the *Center of Gravity*, and the Calculation thereof: Which (*Center of Gravity*) he does not onely demonſtrate *to be* (which others have hitherto Poſtulated, but not any, that I know of, demonſtrated;) but doth from General Principles ſhew, How by Calculation to aſſign the ſame in infinite ſorts of Lines, Surfaces, Solids, as well ſuch as are bounded, or take their riſe from Crooked Lines, as thoſe that are bounded onely with Streight Lines and Plains.

And from the General Principles, here laid down, he doth, in his Third Part (which is to follow) derive the Doctrine of the *Vectis* or *Leaver*; the *Trochlea* or *Pulley*; the *Cochlea* or *Screw*; the *Axis* in *Peritrochio*, or ſeveral ſorts of Wheel-work; and other ſuch Mechanical Engins derived from theſe. As likewiſe the Doctrine of *Percuſſion* (on which depends that of the *Cuneus* or *Wedge*; with many other Speculations of a like kinde:) And that of *Reſilition* or *Rebounding*; which (as appears by a ſhort *Specimen* formerly Printed in *Numb.* 43. of theſe Tracts) he derives from a Repercuſſion, either of ſome other Body in Motion, which it meets with, or from the Elaſtick Force or Spring in one or both of the Meeting Bodies, which, being compreſſed by the Colliſion, doth endeavor to reſtore it ſelf by caſting off theſe Bodies, one or both ways. Conſonant to his Principles here laid down in the Tenth, eleventh, and twelfth Propoſitions of his *Firſt Chapter*; where the *Impedimentum* or *Obſtacle* is made ſufficient to retard or ſtop a Motion; but a *vis contraria* or contrary

Force, neceſſary to give an oppoſite New Motion.

In this firſt Book, he illuſtrates all with Eighty Figures, contained in two compendiouſly contrived Plates: And doth, from their proper Principles, demonſtrate many of theſe things, which Writers commonly Poſtulate, or take for granted; but which (to make a ſure Foundation) ought to have been demonſtrated.

II. *NATHAN. HIGHMORI de HYSTERICA & HYPOCHONDRIACA PASSIONE, Reſponſio Epiſtolaris ad Doct. Willis Med. Londinenſem.* Londini, 1670. *in* 4°.

THe occaſion of Writing this Epiſtle, was, That the Learned Dr. *Willis* in his *Pathologia Cerebri* undertakes to confute the Cauſes of the Hyſterick and Hypochondriack Paſſions, as they are aſſigned by our Author in his *Exercitations*, concerning theſe two Symptons, publiſhed *An.* 1660. Who thereupon thought himſelf obliged to write this *Defence*, in behalf of what he had formerly delivered upon this Subject.

The Controverſie, as to the *former* of theſe Paſſions, conſiſts in this, Whether the cauſe of it is to be referred more immediately to the *Genus Nervoſum*, and it be primarily a Convulſive Symptom, depending on the Brain, and the Nerves thereof; or whether it ought to be imputed to the Blood, ruſhing too impetuouſly into and ſtuffing up the Lungs? Hence

Dr. *Willis* aſſerts the former, and objects againſt the latter, of which, the Vindication is undertaken in this *Epiſtle* ; wherein it is conſidered among divers other things. 1. That the Hyſterick Paſſion is not always accompanied with Convulſions ; where alſo the exiſtence of the *Succus nutritius* (on which Dr. *Willis* his Doctrine ſeems to depend) is called in queſtion, and ſeveral Arguments alledged to the contrary. 2. That, if the *Succus nutritius* in the *Nerves*, be by a violent explosion dilated, and that by the means of *Fixed Salts* mixed in the *Nerves* with *Acid* ones (according to Dr. *Willis* ;) the ſame may happen upon the Concurrence and Conflict of the like Salts in the Blood.

Concerning the *Hypochondriack Paſſion*, the Queſtion between theſe two Phyſitians, is, Whether the firſt and chief cauſe of that diſtemper, be the Weakneſs and Laxeneſs of the tone of the Stomach and its Fibres, whereby a vicious Chyle and Blood is generated, that cauſes ſuch a Fermentation, upon which do enſue Trembling and Palpitations of the Heart, Swoundings, Fear, Sadneſs? &c. This is affirmed, and here further aſſerted by our Author, but denied by Dr. *Willis* ; concerning which, the *Reader* will finde the beſt ſatisfaction in peruſing the Writings themſelves of both parties.

In the mean time he may pleaſe to take notice here, that Dr. *Highmore* in this *Epiſtle*, interſperſes ſome not inconſiderable Remarks concerning the *Uſe* of the *Spleen*, which part he endeavors to free from thoſe im-

imputations it is commonly charged with, being of opinion, That the Blood is originally depraved not by the *Spleen*, but its matter by the *Stomack*.

III. *NOVVELLES* EXPERIENCES *ſur la VIPERE*, *par M. CHARAS. A* Paris, 1669. in 8°.

THe Author of this Curious Book, having firſt taken notice therein of divers Obſerveables, he met with in the Diſſection of *Vipers*, and among them, of the *ſalival Glands*, he diſcovered in them as well as in other Animals, and thoſe accompanied with *Lymphatick Veſſels*, paſſing into a greater Veſſel running along and under the ſaid Glands, and diſcharging itſelf into the *Veſicle* of the *Gingiva*, and carrying with it the *Salival liquor*, which he makes to be the ſame with that yellow water in the bag, hitherto eſteem'd venomous, bnt by him reputed a meer harmeleſs *ſaliva*; having, I ſay, preſented his Reader with theſe and many other Anatomical Obſervations upon this creature, he makes it his buſineſs,

1. To prove, that the biting of Vipers, at leaſt of ſuch as are in *France*, are indeed venomous, and proved actually mortal: Where he alleadges many Experiments, made by himſelf in the preſence ef many Phyſitians and others, evincing this Aſſertion; in the recitation of which, he obſerveth not a few remarkable P*hænomena*, ſeen in the Animals, bitten by Vipers, both without, and alſo within them when dead

and

and opened; particularly, that he found all their Vitals and Viſcera freſh and in a good ſtate, but the Blood in all of them, that were opened, either coagulated already and blackiſh, or tending towards coagulation.

2. To confute the opinion of thoſe (and by name of the famous Italian Philoſopher *Redi*, who, a few years ſince, pnbliſht alſo a Book of *Vipers*) that aſſert, that the Venom of theſe Animals reſides in the Jellow liquor contained in the Bagg about the Vipers teeth; whereas this Author will have it to be in their vexed and enraged ſpirits: which he thinks, he hath ſufficiently proved by wounding ſeveral Animals with ſome of the biggeſt teeth of Vipers, pulled out, and letting into wounds thus made, and rubbing with that reputed poiſonous liquor of the bag; whereupon no ill effects at all have followed. Which he confirms by another tryal, wherein, holding the Jaws of a Viper, and then thruſting its teeth into the fleſh of a living Animal, and letting the Juyce of the bag into the wound, no ill conſequence appeared, conſidering that the angred Spirits of the Viper, in that forced and reſtrained poſture, were kept from paſſing abroad; for the emiſſion of which he ſuppoſeth the freedom of the Animal is required.

3. To recommend, among divers other Antidotes for the bitings of Vipers, the *Volatile* Salt made of them; the vertues of which he exceedingly praiſeth, alledging the Example of a perſon, who being bitten by a Viper, could be ſaved by no other means,

but by ſeveral *doſes* of this Volatil Salt; whoſe preparation he at larg deſcribeth.

This Book is likely to be forthwith tranſlated into English, to be printed for the Stationer, that taketh care of theſe Tranſactions.

IV. *ATHANASII KIRCHERI ARS MAGNA SCIENDI ſive COMBINATORIA.* Amſtelodami. 1669. *in fol.*

THis Voluminous Work is divided into Eleven Books;in which the Author having taken ſome pains to ſhow the Defects and Difficulties in the famous *Lullian* Art, pretends by a new and Univerſal Method, that is, by an Artificial Combination of the Subjects of knowledg, to enable men to diſcourſe and diſpute, innumerable ways, of every thing propoſed, and to acquire a ſummary and general knowledge of all things. So that his *Combinatory* Art, as he cals it, conſiſts chiefly in this, that any ſubjects being given or propoſed, it ſhews, how often and how many ways they may be combined together, or exchanged, or tranſpoſed among themſelves.

Of this *Art* he firſt ſhows the Theory, and the Rules,in the firſt 5 Books; and then in the other 6. he applyes theſe Rules to Practice by Examples, relating to the ſeveral Arts and Sciences.

Of what Uſe this Doctrine may be for the attainment of knowledg with more eaſe or advantage, the ſagacious Reader may Judge.

V. *LE SYSTEME GENERAL DE LA PHILOSOPHIE*, *par* Francois Bayle D. *M. A* Thoulouze, 1669. *in folio.*

THis ſmal Tract, conſiſting only of 4. Sheets, may ſerve to initiate thoſe, that deſire to be acquainted with the ſum and import of the *Carteſian* Philoſophy. It delivers, in 11. Chapters, theſe 11. Heads: The Metaphyſicks of that famous Philoſopher; his Logick; Principles of Natural Philoſophy in general; his Doctrine concerning the Productions made in the Bowels of the Earth; concerning Meteors; Senſible Qualities; Plants; Animals; Man; Humane Paſſions; and Ethicks.

VI. *THEODORI KERCKRINGII D.* M. *SPICILEGIUM ANATOMICUM*, *continens Obſervationum Anatomicarum rariorum Centuriam unam*, *nec non OSTEOGENIAM FÆTUUM.* Amſtelodami, *A* 1670. *in* 4°.

THis ſeems to be a very Curions Collection; to which the Author premiſeth in the *Preface* his opinion concerning the R*enes ſuccenturiatos*, viz. That they ſeem to be Caſes, wherein is elaborated a Bilious Juyce; which afterward by the Emulgent veine, or often immediately, paſſeth to the *Cava* and thence conveyed to the Heart, cauſeth there that Effervescence, which *Sylvius* contends to be in that part excited by the mixture of a ſaltiſh liquor with an Acid: for al-

although Experiment do contradict the Conveyance of the Juyce out of the Liver, through the *Cava*, yet (*ſaith he*) may that efferveſcence in the heart (on which the whole Syſteme of *Sylvius* is grounded) ſtill hold, if this opinion about the uſe of theſe Kidneys be true, eſpecially ſince there needs but little *Leven* to ferment a great Maſs; there being required but a very little Salt of *Tartar* to be mixt with a good quantity of Spirit of *Vitriol*, to cauſe a vehement and durable Fermentation, though a conſiderable plenty of the latter, mingled with a ſmall quantity of the former, produceth but a languid and ſhort Efferveſcence.

As to the *Collection* it ſelf, it conſiſts of divers uncommon, and very conſiderable Remarks, delivered by the Authors own Obſervation; *E. G.* A *Dutch Stuyver* ſwallowed down, and by cloſing the *Pylorus* of the Stomach, killing the Patient in ten days; on the contrary, a ſmall Braſs-coyn being ſwallowed, was after a Moneths time voided by Purges, and the Patient ſaved, the Coyn being ſo worn in the Stomach, that the ſame hardly appeared: *Item*, Of a Tumor on the Back, reſembling a Sack filled with Corn, formed there by the force of Imagination: Examples of Superfœtation, and Ambiguous Births; of Animals bred in the Ear, and Worms come out of the Noſe; of two Niples in one Breſt; of divers very odd Monſters; of Infants born with Teeth; of a periodical ſpitting of Blood; of Stones growing upon the Wind-pipe, in the Brain, and the Heart, and killing the Patients; of a double *Vena Cava*, of a treble *Ductus Thoracicus*;

cus; of four Spermatick Arteries found without Spermatick Veins; of a portion of a *Secundine*, voided uncorrupted and innoxiouſly, four Moneths after the production of the Childe; of a Woman, frighted by the prediction, made by a Beggar, of the day of her death, and dying on that very day; of a very ſtooping and crooked Man, not above forty years of age, made ſtreight again by purging away tough humors, beſiedging the Muſcles; of a Boy, and of ſeveral Sheep deſtitute of Brains; of many Obſervables in one and the ſame Body; of various complicated and odd Diſeaſes in one Patient; of a Woman gone about ſeven Moneths, who being exceedingly frighted at the hearing of her Daughters falling down Stairs upon her Head, and breaking the hind part of the Skull, was a few days after delivered of a dead childe, wanting the whole Bone of the ſame part; of the *Catamenia* flowing thorow the Crown of the Head; others, thorow the right hand; others, from the very time of a Childes Nativity; of a Childe incloſed in a *Mola*; of a means of reſtoring the Sight, deprived of its Chryſtalline, and the other Humors.

The other part of this Book treats of the gradual and ſucceſſive Growth of the Bones in a *Fœtus*; for the better obſervation of which, the Author affirms to have by him *Sceletons* from the ſecond Moneth after the Conception, to the very Ninth Moneth, aſſuring the Reader, that he delivers nothing, but what he knows by his own clear inſpection; which he performs in ſuch a manner, that he onely relates the more rare particulars, wherein the *Fætuſs* do differ from *adult* Bodies, or he in the Doctrine of the Bones of *Fætuſs* from other Authors, or which being un-obſerved of others, he hath obſerved more accurately; now and then alſo confirming, what others, by reaſon of the odneſs of the thing, yet doubted of. In ſhort, he deduces the increaſe of the Bones through their ſeveral intervals of Times, and gives an accompt, How they are conſtituted in the firſt two Moneths, in which there hardly appeareth any thing of Bones diſtinguiſhable; then what of them, about the Third, fourth, and the reſt of the Moneths, is ordinarily changed, added, or taken away, at leaſt in the *Fætuſs* of theſe Climats. The ſum is, That there is a Tranſmigration of Membranous parts into Cartilagineous, and from them into Bony ones; performed by Nature with ſuch ſilent ſteps, that the moſt quick-ſighted, and the moſt patient Eye ſhall never ſee it doing, though it may evidently ſee it done.

*ERRATA in Numb.*53.

PAg.1062. l.1. r. *Durtwich*, p. 1064. l.4. r. *two pounds four ounces and an half*, ibid. l. ult. r. *or chiefly*, p. 1066. l. 26. r. *with a lower hole*, p. 1067. in Fig. 3. r. *The Book with*, p.1074. l.17. r. *throughly inured.*

*ERRATA in this Numb.*54.

P. 1076. l.17. r. *Denys's Advocat very*, p.1088. l.26. r. *ways; conſonant.*

Printed by *T. N.* for *John Martin*, Printer to the
Royal Society, and are to be ſold at the Bell
a little without *Temple-Bar*. 1669.

Numb. 55.

PHILOSOPHICAL TRANSACTIONS.

January 17. 1670.

The Contents.

An Accompt of ſuch of the more notable Celeſtial Appearances of the Year 1670, *as will be conſpicuous in the* Engliſh *Horizon*; *and among them*, *an* Eclipſe of the Sun, *in part viſible here in* England, *though pretermitted*, *as ſuch*, *by others*; *as alſo of divers* Stellar Eclipſes, *to be cauſed by the Moon*, *covering ſeveral Fix'd Stars. Some Obſervations concerning the Barometer and Thermometer*, *made by Dr.* Beale *in* Somerſet; *and others of the like nature*, *made by Dr.* John Wallis *in* Oxford. *An Accompt of a ſmall Tract*, *entituled*, THOMÆ HOBBES Quadratura Circuli, Cubatio Sphæræ, Duplicatio Cubi,(*Secundo Edita*,) Denuò Refutata, A. JOH. WALLIS, *S.T.D.* &c.

An Accompt

Of ſuch of the more notable Celeſtial Phænomena *of the Year* 1670, *as will be conſpicuous in the Engliſh Horizon*; *written by the Learned and Induſtrious Mr.* John Flamſtead. *Novemb.* 4. 1669. *and by him addreſſed and recommended for encouragement*, *to the Right Honorable*, *the Lord Viſcount* Brouncker, *as Preſident of the* Royal Society.

My Lord,

AMong thoſe many Illuſtrious, Noble, and Generous Perſons, who have the honour to be in the Liſt of the *R. Society*, I find numbered ſome Aſtronomers, whom our Age accounts its Glory, and our Arts their Support: which induces me to believe that among all thoſe Ingenuous Arts and Sciences , which have put themſelves under their Patronage , and look for an improvement from their Induſtry , the *Celeſtial* are not to be accounted the laſt. Their Excellent Hiſtory ſhews , that they have not neglected the *Heavens*. And their endeavours for the Improvement of *Optick Glaſſes* , and Encouragement of ſuch as labour therein , do more than obſcurely indicate thoſe high reſpects they have for the Sublimeſt of Human Sciences, *Aſtronomy*.

Theſe conſiderations invited me to addreſs myſelf , with theſe my following labours , to your Honor , who hold ſo high a place in that illuſtrious Body , and are known to excel in the knowledge as well , as the Love of that Science , I ſtand ingaged in. You know, *My lord*, How much it conduceth to the Advancement of *Aſtronomy* , and the Correction of our *Canons* , to have the Celeſtial Appearances accurately obſerved , and how much it concerns the Obſerver to have notice of what *Phænomena* the Heavens exhibit convenient for his Obſervation. I have endeavoured in the following pages to accommodate him with the Calculations of ſuch of the more notable *Phænomena* of the Year 1670,, as will be conſpicuous in the Engliſh Horizon , if the Heavens be clear ; and ſhall , God willing , performe the like for future Years , if I may be but encouraged by the acceptance of theſe

I was excited to this task by peruſing the *Mercurius in Sole viſus* of the Excellent *Hevelius*, who hath oblieged Aſtronomy by his accurate Obſervations of the *Moons tranſits* by and over *Saturne* , and her occultations of *Spica Virginis*, and the *Clara in fronte Scorpii.* I ſaw nothing to hinder Us from performing as much , ſince we cannot want inſtruments , at leaſt, as good as His , if we had but the like induſtry , and notice alſo of the time, when the Appearances would preſent themſelves. Though I was not furniſh't with very fit Inſtruments , yet hoping , that I might do ſomewhat worth my labour , I revolv'd Mr. *Wings Ephemerides* for this year , to find, what Stars the *Moon* might cover , and how often , in her Revolution. Thoſe Occultations, which I collected might be conſpicuous , I re-calculated from the exacteſt Tables , I know in being, the *Caroline*, of Mr. *Street*, and theſe I ſhall here preſent you with at large. Theſe Supputations, when I firſt framed them, I fitted to the Meridian of my habitation, intending them only for my own private uſe; but upon ſecond conſideration, finding, how much the Obſervations, if rightly and accurately performed, might conduce to the better ſtating the Dimenſions of the Moons Orbite, and ſolving the Irregularities of ſeveral *Phænomena*, I reſolv'd to communicate them to the Ingenious, and to deſire their utmoſt care in obſerving theſe Appearances, which I had not un-accurately calculated. And I now humbly proſtrate them to their peruſal, deſiring, that, if they ſeem worthy, you will be pleaſed to impart them in ſuch a way, as you ſhall think fit, to ſuch intelligent and induſtrious perſons either of the R. *Society*, or others, as will be accurate in their Obſervations, and willing to communicate what they ſhall have obſerved,

I hope, *My Lord*, you will not account me faulty for having adapted the Calculations to the *Meridian* of a place no more famous than *Derby*. You had the occaſion before; to which I may add, that the *Meridian* paſſing over *Derby* is nearer the middle of *England*, than that of *London*; and that its *Latitude* bi-ſects it nearer, than any yet ſtated: So that this Town, which is ſeated in *Umbilico quaſi Regni*, muſt needs be the moſt convenient place, that can be choſen, where-on to fix our Calculations. For, the diſtance of any place within this kingdom from it, will not much vary the manner of their Appearance in any of the *Phænomena*, except the Eclipſe of the Sun: for, in the Occultations, the Stars will appeare to paſs nearly under the ſame Angles and Spots of the

Moon

Moon; nor will the times of the *Phaſes*, or the *Moræ ſub Luna* differ much in any place of the Kingdom; nor at all, if a due conſideration be had of the *Differences* of *Meridians*, and the *Laws* of *Parallaxes.*

I come now to the *Phænomena* themſelves. Mr. *Wing's Ephemerides* and others tell us, that we ſhall have but one Eclipſe, and that of the Moon, conſpicuous this Year. But, *pace hujus Aſtronomi*, I dare affirm, that a part of an Eclipſe of the Sun will, if the weather permit, be viſible to us alſo: Which I have therefore calculated from the *Caroline Tables* to the *Meridian of Derby*, whoſe *Longitude* from *London*, I have us'd in this Eclipſe, is 6 min. to the Weſt, and *Latitude* 52 deg. 57 min.

By which Tables on Saturday *April 9th.* at the time of Sun-ſet, ſuppoſed at 7 *ho.* 3 *minutes P. M.* I find,

		ſ.	d.	m.	ſec.
The Suns Mean Anomaly		9	21	13	52
The Moons Mean Anomaly		7	9	31	43
The Place of her Apogeum		5	7	40	31
The Place of her Node		0	21	38	20
The Suns true place,		♈	29	55	25
The Moons true place,		♉	0	23	46
With North-Latitude			0	45	47
The Point culminating,		♌	11	6	29
The Horoſcope,		♏	0	1	20
The Altitude of the Moons Center			0	44	10
The Parallactical Angle			33	55	35
The Parallax of the Moon from the Sun in	Altitude		0	59	39
	Longitude		0	49	30
	Latitude		0	33	18
Therefore the Moons viſible place,		♈	29	34	16
In Antecedence of the Sun			0	21	9
With Viſible North-Latitude			0	12	29
The diſtance of the Sun and Moons Centers			0	24	34
The Suns Semi-diameter			0	15	49
The Moons Semi-diameter			0	16	7
Summe			0	31	56
Parts defective			0	7	22
			dig.		
Therefore the digits darkn'd			2	47	40
The Inclination of this *Phaſis* above the Eclipticks is			0	30	33
			deg.		
And from the Suns Zenith			115	31	33

By this *Calculus* it appears, that the Sun is ſo far from not being eclipſed, that he is obſcured near 3 digits in the ſetting.

Now to find, when the Eclipſe begins, I re-calculate the places of the Sun and Moon to 6 *h.* 46 *m.* *P. M.* and inveſtigate

			d.	m.	ſec.
The Suns place,		♈	29	54	44
The Moons place,		♉	0	13	19
With North-Latitude			0	44	50
The Mid-heaven,		♌	6	54	28
The Point deſcending,		♈	27	6	10
The Altitude of the Moons Center			3	1	14
The Parallactical Angle			33	7	40
The *Parallax* of the Moon from the Sun in	Altitude		0	59	33
	Longitude		0	49	56
	Latitude		0	32	54
The Moons Viſible place,		♈	29	23	23
With Viſible North-Latitude			0	12	16
Leſs then at 7 *h.* 3 *m.* by			0	0	13
Ergo, The Angle of the Moons viſible way with the Ecliptick			1	8	26
The Angle of Incidence in the beginning			23	48	18
Motion ſeen from 6 *h.* 46 *m.* to the inchoation			0	1	53

Therefore the time of the beginning, *6 h.* 49 *min. P. M.* The firſt contact will appear 122 *d.* 55 *m.* from the Suns Zenith. And *I* am perſwaded, that this *Calculus* doth exhibite this *Phænomenon* nearly, as it will appear unto us: And *I* queſtion not, but that in and near our *Meridian* it will be obſervable, if the Air hinder not. *It* is an Appearance that will richly merit the accurateſt of our Obſervations. For the Moons mean Anomaly being about 7 *Sign.* 11 *deg.* we may the better judge by the Obſervation, Whether the *Æquations* of her *Orbite* be Oſcillatory, or not. Nor need we ſcruple about the *Æquation* of *Natural days: I* have fully demonſtrated the Æquations, ſo that *I* am perſwaded, no one hereafter will controvert them; and *I* ſhall ere long, if God will, commit them to your and the publick cenſure.

I ſuppoſe the beginning of this Eclipſe may, if the Air be ſerene, appear at *London*; but its *Meridian* being removed to the Eaſt from ours, 5 or *6 minutes*, and its Latitude being leſs, ſo that the Altitude of the *90 deg.* and conſequently the Parallax of Longitude will be greater, and of Latitude, leſs: *It* follows, that the Eclipſe will be retarded, and that only the beginning thereof, ſcarce to *one digits* Obſervation, will there appear; but in the *North* and the *Weſtern* parts of *England* and *Scotland,* it will appear more fully: and in *Ireland* it will be viſible to the middle of the Eclipſe.

For the well-obſerving of this noble Appearance, *I* need not ſuggeſt the way of caſting the *Species* of the Sun through a good Teleſcope of a competent length, on an extended paper, placed behind the Eye-glaſs ſo far, as that the ſaid *Species* may appear at leaſt 6 inches over; then dividing *both* his *Periphery* into 360 degrees, for the better obſerving the *Inclination* of the *Cuſps* of each *Phaſis*; *and* his *Diameter* into digits, and their parts by Concentrick Circles, for meaſuring the quantities of the obſcured parts. For the meaſuring of time, the skilful Obſerver will be furniſht with good *Quadrants*, *Clocks*, or *Pendulums*.

But to proceed to the Occultations, that may be made by the Moon, of the leſſer Lights; I ſhall take notice, That thoſe Stars, that have not above *6 d.* 20 *m.* Latitude from the *Ecliptick*, may all of them, ſome time or other, be cover'd by the Moon, in her paſſing through the *Zodiack*: Of which ſort I have numbred, from the *Tychonick Catalogues*, the Stars ſo lying as you ſee in the annex'd Table: And I find in the *Zodiack* 189, with *6* in the *Pleiades*, 12 in the Northern, and 5 in Southern Conſtellations, plac'd out of the Ecliptick; the total is 212. Of theſe the Moon frequently hides one or other, yet no notice taken of it by the *Ephemerides* of our Aſtrologers.

Aries	12	
Taur.	21	
Gem.	21	
Canc.	12	
Leo	22	
Virg.	18	
Libr.	12	
Scorp.	8	
Sagitt.	14	
Capr.	20	
Aquar.	16	
Piſc.	13	
For. Auriga	5	*Bor.*
Ophiuch.	7	
Cete	3	*Auſt.*
Orion.	2	
Pleiad.	6	*Bor.*
Sum	212	

It would be too large a labour for one man to undertake the calculating of all the Occultations obſervable in this year, nor is it perhaps ſo needful: for, the Stars of the 5th and *6*th Magnitude are more numerous, nor ſo accurately (I doubt) rectified, and the Moon approaching them within 4 or 5 degrees, abſconds them to the naked eye; and if the Obſervation be undertaken with a Teleſcope, other ſmaller Stars may be miſtaken for thoſe, the *Calculus* intends, and ſo both the Obſerver deluded, and the Art prejudiced.

But the Moon will ſeveral times this year cover two noted Fix'd Stars; of which, that I may gratifie the Curious, and excite the Induſtrious to the like endeavors, I ſhall give here the *Calculus* of the Occultations and Tranſits, from the *Caroline* Tables.

I. The

* *This Diſcourſe came too late to hand, for giving timely notice of this* Phænomenon; *though nothing be loſt by this loſs of time, as appears by the Advertiſement it ſelf.*

I. The firſt Occultation almoſt uſhers in the Year*: For on *January* 2. in the morning, the Star, called *Præcedens illarum quatuor in alâ Virginis Auſtrina*; may be covered with the Moons Southern limb. But fearing, that this Appearance will ſcarce be conſpicuous, becauſe the approaching light of the Sun will ſeize the Star before the beginning of the Occultation, I forbear to calculate it.

II. The next obſervable Occultation will be on *February* 25. a little before 8 at night; the Moon then again covering the ſame Star in the *Virgins* South-wing: For which take this *Calculus* from the *Caroline* Tables; wherein I have ſupputed the Moons viſible place to 7 *h.* 28 *m.* and 8 *h.* 18 *m. P. M.* at *Derby*, ſuppoſing its Longitude to the Weſt from *London* 5 *m.* 30 *ſec.* and its Latitude, as *I* obſerv'd it, 52 *d.* 58 *m.*

	To 7 *h.* 28 *m.*				*To* 8 *h.* 18 *m.*			
	ſ.	*d.*	*m.*	*ſec.*	*ſ.*	*d.*	*m.*	*ſec.*
The Moons Mean Anomaly	0	18	4	3	0	18	31	16
The Moons true place	♍	29	15	4	♍	29	39	45
The Argument of Latitude	5	5	55	34	5	6	21	43
The Moons true Latitude North		2	2	33		2	0	29
Semidiameter							14	22
Her Horizontal Parallax	♓	17	35	47	♓	17	51	
The Suns right Aſcenſion		348	36			348	38	
The right Aſcenſion of the Mid-heaven		100	36			113	8	
The Mid-heaven	♋	9	44		♋	21	23	
The Horoſcope	♎	7	18		♎	15	39	
The Angle Orient		60	17			59	13	
The Moon from the Aſcendent in the Ecliptick		8	3			16	19	
In a great Circle		8	18			16	26	
The Altitude of the Moons Center		8	0			15	1	
Her Azimuth from the Aſcendent		2	16			6	45	
Her Parallactical Angle		29	47			31	26	
The Moons Parallax in Altitude			52	46			51	33
Longitude			45	48			43	59
Latitude			26	13			26	54
The Stars place *Libra* 0 *d.* 10 *m.* 19 *ſec.* with Latit. Boreal.						1	25	0
The Moons viſible place	♎	0	0	52	♎	0	23	44
Wih viſible Latitude North		1	36	20		1	33	35
In Antecedence of the Star			9	27	*in conſeq.*		13	25
With greater Latitude North			11	20			8	35

Her

	d.	*m.*	*ſec.*
Her viſible Motion from 7 *h.* 28 *m.* to 8 *h.* 18 *m.* is	0	22	52
The difference of the Moons viſible Latitudes	0	2	45
The Angle of the Moons viſible way with the Eclip.	6	51	27
Her viſible Latitude at the apparent Conjunction	1	35	12
The Angle of Immerſion beneath a ſtraight line drawn through her Center parallel to the Ecliptic —	51	33	3
Motion from the *I*mmerſion to the viſib. Conjunct.	0	9	1
The Angle of Emerſion beneath the parallel	37	42	5
The viſib. Motion from the o *m*, to the Egreſs appar.	0	11	30
Apparent Mot. from 7 *h.* 28 to the Immerſion	0	0	36
Apparent Mot. from 8 18 to the Stars Egreſs	0	1	55
The time from 7 28 to the Sub-ingreſs	0	2	9
The time from 8 18 to the Stars Emerſ.	0	4	22

Therefore the Sub-ingreſs	7	29	6.
Emerſion	8	13	38.
The Stars *Mora* under the Moon	0	44	32.

The Stars Latitude from a line drawn over the Moons Center parallel to the Ecliptick	in the	*I*mmerſion	11	17
		Egreſs	8	50

Over what Spots of the Moon, the ſeeming way of the Star would paſs, *I* do not here ſhew, becauſe I dare not rely on our Selenographical Tables. *I* proceed therefore to the next.

III. March 3. in the morning, the Moon paſſeth over *Antares*, or the *Scorpions heart*, whoſe Longitude to the *Caroline Author* is then *Scorpio* 5 *deg.* 7 *m.* 20 *ſec.* and Latitude South 4. 27. The Ecliptical Conjunction by the *Ephemerides* was *March* 2. 16 *h.* 54 *m. P. M.* Wherefore, for the better inveſtigating the times of the beginning and end of this Occultation, *I* have calculated the true and viſible places of the Moon to 16 *h.* 39 *m.* 52 *ſec.* and to 17 *h.* 49 *m.* 52 *ſec. P. M.* by the ſaid Tables to the Meridian and Latitude of *Derby*, as follows;

	To 16 *h.* 39 *m.* 52 *ſec.*				To 17 *h.* 39 *m.* 52 *ſec.*			
	ſ.	*d.*	*m.*	*ſec.*	*ſ.*	*d.*	*m.*	*ſec.*
The Moons mean Anomaly	2	28	22	56	2	29	1	3
Her true place	♐	4	41	0	♐	5	18	18
The Argument of Latitude	7	12	4	41	7	12	40	10
The Moons true Latit. South		3	32	0		3	34	30
The Horizontal Semi-diameter			15	21			15	21
Parallax			56	45			56	45
The Suns true place	♓	22	57	21	♓	23	0	15
The Suns right Aſcenſion		353	32			353	35	
The right Aſcenſion of the Mid-heaven		243	30			261	3	
The Mid-heaven	♐	5	26		♐	21	47	
The Horoſcope	♒	3	10		♒	7	31	
The Angle Orient		18	42			14	15	
The ☽ from the Aſcend. in the Eclipt.		58	29			87	47	
In a great Circle		58	33			87	47½	
The true Altit. of the Moons Center		19	21			17	45	
Her Azimuth from the Horoſcope		56	26			87	40	
Her Parallactical Angle		79	47			89	26	
Her Parallax in Altitude			53	50			54	18
Her Parallax in Longitude			9	33			9	32
Her Parallax in Latitude			52	59			54	18
Therefore her apparent place	♐	4	50	33	♐	5	17	46
In Antecedence of the Star			16	47	in conſ.		10	26
With Latitude South, then the Star leſs			2	1	more		1	48
So her viſible motion to 1 *h.* 10 *m.* is						0	27	13
The difference of her Latitudes						0	3	49
The Angle of her viſible way with the Ecliptick						7	59	0
The Angle of Incidence under a parallel line to the Ecliptick						6	45	32
Angle of emerſion above the line drawn by the Moons Center						9	12	28

	h.	*m.*	*ſec.*			
The apparent motion from	16	39	52	to the ſub-ingreſs	1	27
The apparent motion from	17	39	52.	to the emerſion	4	49
The time from	16	39	52.	to the ſub-ingreſs	3	46 *t*
	17	39	52.	to the egreſs of the Star	13	32

	h.	*m.*	*ſec.*	
Therefore at *Derby* the ſub-ingreſs	16	43	18	*P. M.*
Therefore at *Derby* the emerſion	18	0	24	*P. M.*
The Stars *Mora* under the Moon	1	18	46.	

		m.	*ſec.*	
The Stars Latitude from a line drawn through the Moons Center parallel to the Ecliptick in the	Ingreſs	1	54	South
	Egreſs	3	7	North

At the middle of this Stellar Eclipſe the Moons Center is but 20 *ſec.* more to the South than the Star; ſo that, if the Libration of the Moon be known, the protraction of the Star's way in this Appearance will be facile. And this *Phænomenon* is highly worth our ſtricteſt Obſervations; for, the Moon being almoſt in her *Mean* diſtance (where there is no great difference among Aſtronomers about her primary æquations) we may the more ſecurely judge of her *ſecond* inæqualities, and perhaps diſcover a *third*, which may promote the Moon, and accelerate the times in this Appearance. If diligent heed be given to the times of the ſub-ingreſs and emerſion of the Star, and with what Spots on the Moons face it keeps in a right line, we may be well aſſiſted, by the obſerued *Mora* to judge of her *Diameter*; for *I* queſtion not, but her Apparent Horary Motion, may, with ſome little trouble, be exactly enough inveſtigated either from the *Wingian* or the *Caroline* Tables.

IV. March 24. *h.* 15. 35 *m. P. M.* by the *Ephemerides*, the Moon will be in the ſame *Longit.* with the fore mention'd Star *in ala Virg*; with almoſt 2 degrees *North-Latitude*: whence at firſt *I* expected an Occultation; but upon a better *Examen I* find the *Caroline* Tables only preſent a *Tranſit*, as I ſhall prove by this *Calculus*, framed to the *Meridian* and *Latitude* of *Derby*: by which at 15 *h.* 42 *m.* 24 *ſec. P. M.*

	ſ.	*d.*	*m.*	*ſec.*
The Moons *Mean* Anomaly is	0	15	10	37
Her true place	♎	0	5	33
The Argument of Latitude	5	6	38	46
The Moons true Latitude North		1	59	16
Her Horizontal Parallax			52	49
Her Horizontal Semi-diameter			14	17
The Suns Right Aſcenſion		13	28	
The Right Aſcenſion of the Mid-heaven		249	4	
The Mid-heaven	♐	10	41	
The Horoſcope	♒	12	31	
The Angle Occident		16	58	

	ſ.	d.	m.	ſec.
The Moon from the Horoſcope in the Ecliptick		47	34	
In a great Circle		47	36	
Her Azimuth from the Horoſcope		45	53	
The Altitude of her Center		14	23	
Her Parallactical Angle		78	17	
Her Parallax in Altitude			51	21
Her Parallax in Longitude			10	25
Her Parallax in Latitude			50	17
Hence her viſible place	♍	29	54	48
With viſible North-Latitude		1	8	59
Therefore ſhe is in Antecedence of the Star			15	25
With leſs North-Latitude			16	1

Now the Moons Semi-diameter being only 14 *m*. 17 *ſec*. it appears, that the Star is more to the North, than the Moons Limb, by 1 *m*. 44 *ſec*. and the Moons Latitude decreaſing together with the Altitude of the 93d degree, cauſeth the *Apparent* Motion to be viſible in a line bending down from the Star; ſo that near the viſible Conjunction the Star may ſtand about 3 *min*. to the North from the Moons Limb. Though this be not like to prove an Occultation, yet let me deſire thoſe, who have fit Glaſſes and Inſtruments, to obſerve this *Tranſit*, and how far the Star may ſtand from the Limb of the Moon at the time of the viſible Conjunction, that we may be the better enabled to define, *both* how the Motion of the Moon's Latitudes, which ſhall need its limations, is to be reform'd, *and* whether that *Æquation* of the *Nodes*, allow'd by the *Caroline* Author and ſome other Moderns, be firm and valid.

V. The laſt Occultation happens on *May* 23; when 12 *h*. 17 *m*. *P. M*. by the *Ephemerides* the Moon will be in Conjunction with *Antares*. To define the Beginning and End of it, I have ſupputed the Moon's true and viſible places to 12 *h*. 28 *min*. 42 *ſec*. and 13 *h*. 43 *m*. 40 *ſec*. *P. M*. at *Derby*, by the *Caroline Tables*, and I find,

	To 12 *h*.28 *m*.42 *ſec*.				To 13 *h*.43′.40″.			
	ſ.	*d.*	*m.*	*ſec.*	*ſ.*	*d.*	*m.*	*ſec.*
The Moons mean Anomaly	2	17	23	52	2	18	4	41
Her true place	♐	4	52	48	♐	5	33	41
The Argument of Latitude	7	15	12	26	7	15	56	11
The Moons true Latitude South		3	33	0		3	35	37
The Suns true place	♊	12	30	43	♊	12	33	42
The Suns right Aſcenſion		71	2½			71	5	
Right Aſcenſion of the Mid-heaven		258	13			277	0½	
The Mid-heaven	♐	19	10		♑	6	25	
The Horoſcope	♓	1	0 *aſc.*		♎	17	48 *deſc.*	
The Angle Orient		14	41			13	56	
The Moon is diſt. from the Horoſcope		86	7			47	52	
The true Altitude of the Moon's Center		18	11			13	49	
The Azimuth from the Horoſcope aſc.		85	55			46	18½ *deſc*	
Her Parallactical Angle		88	58			80	25	
The Moons Parallax in Altitude			52				54	1
The Moons Parallax in Longitude			0	57			8	59
The Moons Parallax in Latitude			52	52			53	16
So the Moons viſible place is	♐	4	53	45	♐	5	24	42
With viſible South-Latitude		4	25	52		4	28	53
In Antecedence of the Star			13	46	in conſ.		17	11
With South-Latitude than the Star leſs			1	8	greater		1	53
So the Moons viſible motion to 1 *h.* 14 *m.* 58 *ſec.* is							30	57
The difference of her apparent Latitudes							3	1
The Angle of her way with the Ecliptick						5	34	0
The Angle of Incidence, under a Parallel to the Ecliptick, through the Moons Center						4	46	32
The Angle of Emerſion above the ſaid Parallel						6	19	28

	h.	*m.*	*ſec.*			
Motion ſeen from the Sub-ingreſs to	12	28	42	is	1	12
Motion ſeen from the Emerſion to	13	43	40	is	2	16
Time from the Sub-ingreſs to	12	28	42	is	2	54 t
Time from the Emerſion to	13	43	40	is	5	28 t
Therefore the Stars Sub-ingreſs at	12	25	48			
Therefore the Stars Emerſion at	13	38	12			
The Star's *Mora* under the Moon	1	12	24			

		m.	*ſec.*	
The Latit. of the Star from a line drawn parallel to the Ecliptick over her Center, in the	Sub-ingreſs	1	15	South.
	Emerſion	1	40	North.

In this Occultation, as in the preceding, the Center of the Moon paſſes very near the Star, ſo that we may well hereby define, as was advertiſed in the laſt Occultation, both of her *Diameter*, and of the places and *æquations* of her *Nodes*. For in *this*, at 12 *h.* 28 *m.* 42 *ſec. P. M.* the mean Node was in *Aries* 19 *d.* 19 *m.* 34 *ſec.* and the æquation of the Node to be added, 26 *m.* 52 *ſec.* which makes the true Node *Aries* 19 *d.* 46 *m.* 26 *ſec.* But in that of *March* 2 at 16 *h.* 39 *m.* 52 *ſec.* the mean Node was in *Aries* 23 *d.* 39 *m.* 33 *ſec.* the æquation was 55 *m.* 59 *ſec.* to be ſubſtracted; ſo the true Node was in *Aries* 22 *d.* 43 *m.* 34 *ſec.* Now if this Æquation of the Nodes ſhould be neglected, it might make about 5 *min.* difference of the Latitudes, which I have here collected. The Ingenuous therefore will obſerve with all poſſible accuracy, both under what ſpots of the Moon the Stars ſhall enter and emerge in theſe and all other Occultations; and they will note the Times exactly, conſidering the benefit, that will thence accrue to Aſtronomy. The Obſervers muſt not content themſelves with the times acquired by Clocks or rectified Watches, but alſo take the Altitudes of ſome fixt Star, free from Refraction, and remov'd from the Meridian both at the beginning and end of the Occultations, with exact Inſtruments of Braſs well divided.

So far this diligent Author for this time. The other particulars, contained in his Papers, may perhaps be publiſht hereafter. We were to reſerve a part of this Tract for ſome other Communications.

Some Obſervations

Concerning the Baroſcope and Thermoſcope, made and communicated by Doctor I. Wallis *at* Oxford, *and Dr.* I Beale *at* Yeovil *in* Somerſet, *deliver'd here according to the ſeveral* dates, *when they were imparted.*

Dr. Beale *in thoſe Letters of his dated* Decemb. 18. *Decemb. 29. 1669. and Januar. 3.* 16$\frac{69}{70}$.

HAving not look'd upon my Barometer a long time, I did by meer chance caſt my Eye on it upon Munday laſt, *Decem.* 13. *1669.* about one of the Clock p. m.; and juſt then I ſaw the Quickſilver higher, than I dare poſitively affirme that it was ever ſince I had it in my cuſtody, *viz.* ſince *May* 28. 1664. It was compleatly and apparently above half an inch more than thirty inches high. I called younger men to examine it over and over very carefully, by a meaſure, taken exactly from the ſtandard-foot of *London*, both in Braſs and in Box. They meaſured it often from that time, which was Munday, and late in the night of that day; then on Tueſday morning early; oft-times in the day, and late at Night: alſo ſome part of Wedneſday. In all which time, when it was loweſt, it was (as I ſaid at firſt) compleatly 30½ inches; ſometimes manifeſtly higher to the eigth or tenth part of a inch.

For this Baroſcope I have two Glaſs-canes in one veſſel of ſtagnant Quickſilver. They are of equal length, not fully two inches higher, than the Mercury aſcended, and no Bolt-head to either of the Glaſſes. The one hath not been moved theſe two or three years, and hath a tincture of the Mercury on the empty top, as from the ſteams of the Mercury in ſome hot Summer; the other Glaſs was placed there about a year and an half agoe. This hath no tincture on the top. Both agreed in this Indication, as others affirme; but, to my Eye, in the latter Glaſs the Quickſilver ſeemed to be ſomething higher.

The Weather was at firſt diſcovery very bright and clear; a gentle froſt, by the Suns heat melting. The Air was very ſilent, no wind ſtirring, and the curious Wind-vane noting, that the wind was directly in the *Eaſt* all the firſt day (*Decemb.* 13;)

on *Decem.* 14. the wind had a ſhort ſwing from the *North-weſt*, and haſtened again toward the *Eaſt*, yet ſo as to be *North-Eaſt*. During this agitation, or change or Winds, the Mercury deſcended a little; and after, upon the reſetling of the wind, the Mercury aſcended a little higher, than it had been the day before.

My Houſe and Study, where I keep this Baroſcope, is on the ſide of an Hill; on the higher ſide of this Country, as I gueſs near a level with the Head of a River; which River, running ſlowly, and falling into the *Severne*-ſea about 20. or 30. miles Weſt-ward of *Briſtol*, we cannot be very much above the level of the Sea.

My Thermoſcope, ſtanding cloſe by my ſaid Barometer, was at the juſt hight of ordinary diſſolving Weather. In the following dayes it was colder. Whether the late Summer-drought, or what elſe, might incline this Winter-air to have more than ordinary Weight, or a ſtronger Spring, I muſt refer to the conſideration of the more skilful. And if you pleaſe to give notice for a general Obſervation, what Springs do now moſt fayle, or more abound in any Vertue, Quality, or Quantity, it may probably be inſtructive for divers inferences; and particularly, it may give ſome degree of indication, Whether the Springs proceed from the fall of Rain, or by Subterraneous paſſages from the Seas, or by change of Air into Water.

But to returne to my Thermometer, I ſhall give you further notice, that on *Decemb. 26. 1669.* in the Morning, the Weather was colder than ever I found it, ſince I could take it by the meaſure of a Thermometer, that is, ſince theſe 5. or 6. years. It was very cold and frezing quick ſome dayes before, and ever ſince: And yet in this time the Mercury hath ſometimes faln more than an Inch, without any other change of Weather, than ſome guſts of wind, ſome ſprinklings of Snow * at ſeveral times, in all, ſcarce enough to cover the ground; and ſome abatements of Cold more eſpecially when the Sun was up.

I have examined my *Ephemeris* from May 28. 1664. till now: In all which time I find it not remark'd for any ſuch degree

* *This was written before the great Snow fell.*

gree of Cold, as hath been, ſince *Chriſtmas* began, and continues every Night and Morning to this very day of *Decemb.* 29; though the extremeſt was, as hath been ſaid, on *Decemb.* 26. To note this degree of Cold more particularly, I muſt acquaint you, that in my ſtanch Thermometer on the ſaid 26 of *December*, the Liquor was at *three* inches and an *half*. This morning (*Decemb.* 29.) and one or two other mornings it was at *three* inches and *three quarters*. Moſt other times of theſe Cold days, Morning and Evening, it was at the height of *four* inches, in ordinary Briſk Froſts it is at *ſeven* inches. Yet here I muſt obſerve, that ſometimes the Froſt diſſolves, w en it is at the 7th figure, and ſometimes I find it at the 8th figure in a ſmart froſt: Whether the Winds, which come not to the Thermometer, may cauſe this difference, or what elſe, I know not. But to proceed, 'tis warm *May*-weather, when 'tis at the 10th figure, and 'tis not much above the 12th figure in the hotteſt weather of *June*, *July*, and *Auguſt*. To compare with former Winters, the loweſt mark is upon *Decemb.* 17. 1665; and then it was at the height of *five* inches and an *half*. And in *Decemb.* 31. 1666, it was about the ſame height; and there I find theſe words; *Very cold, above all of this year, hitherto.* Neither do I find any note ſo low, till this preſent, which is conſiderably lower.

I think it remarkable, that the 7th Inch, and ſometimes the 8th in my Thermometer ſhould abide Freezing, and the Froſt increaſe, till the Liquor deſcended $4\frac{1}{2}$ inches; and yet, that it ſhould not aſcend from the 8th inch more, than $4\frac{1}{2}$ inches in our hotteſt Summer, being hung in the ſame place within 18 inches of the Glaſs-window, facing the *North-weſt*, and in a little Writing-room, in the ſecond row of Buildings. But now I am ſtrongly perſwaded, that the degrees of Heat and Cold are not exactly indicated by the incloſed *Spirit of Wine*: For, when the Snow melted, and the Froſt was firſt diſſolved without Sunſhine, the Liquor was not above the height of *five* inches and an *half*. Poſſibly it retains ſome part of the Cold a while after the ambient Air becomes more tepid.

So farr Dr. Beale. What Dr. Wallis *was pleaſed to impart on this Subject, was written* January 7. 17$\frac{69}{70}$, *at* Oxford, *as follows.*

Concerning my Thermoſcope and Baroſcope (the former of which is known to give accompt of the Temper of the Air, as to *Heat* and *Cold*; the other, of its *Weight*;) I have ſome few particulars to add to the Obſervations, I ſent you ſome years agoe.

The *firſt* is, that, whereas I did then obſerve, that in Hot weather the Quick-ſilver in the Baroſcope did uſe to riſe obſervably, eſpecially in Sun-ſhine and the Heat of the day; which might *ſeem* to argue the Air to be thereby made heavier, (which *I* find was the caſe of ſome other Baroſcopes as well as of mine, and put us to ſome thoughts concerning the reaſon of it;) I do now find (having kept the ſame Barometer, for the ſpace of five years, unalter'd,) the caſe, for theſe two years laſt paſt, to be ſomewhat otherwiſe: And that in hot Sun-ſhiny weather the Quick-ſilver doth rather ſubſide a little; and in extreme Cold and Froſty weather it riſeth.

Which maketh me Judge the Cauſe of theſe contrary Obſervations to be this, *viz.* That the Quick-ſilver, at its firſt putting into the Tube or Baroſcope, was not ſo perfectly cleans'd from Air, but that ſome ſmall quantity of it did remain, undiſcern'd, in the Quick-ſilver: Which latent particles of Air, though ſo ſmall as not to be at all diſcernable to the eye by bubbles, yet by the external heat (adding new ſtrength, as it uſeth to do, to its Elaſtick or Springy power) were ſo much expanded as to give ſomewhat a greater bulk to the ſame quantity of Quick-ſilver, with which it was mingled, and conſequently to make it riſe ſomewhat higher, as being *ſpecifically* lighter (that is, having the ſame weight in a larger dimenſion, or, in the ſame dimenſions, a leſſer weight;) and, upon the receſs of the external heat, the Spring again ſlackening, the Air, being more compreſs'd, ſuffer'd the Quick-ſilver to be again contracted into its former leſſer Dimenſions, and ſo to become heavier, and not to riſe ſo high as before, when it was hotter. But now, the Quick-ſilver, having continued in the Tube for five years and upwards, hath by its own weight cleanſed it ſelf better from that little Air that was in it; and that Air, freed from its entanglement with the Quick-ſilver, being got up into the void part of the Tube above the Quick-ſilver, doth act contrary-wiſe, that is, when it is by Heat (upon the ſtrengthening of its Spring) expanded, it preſſeth down-ward upon the Quick-ſilver, and doth a little depreſs it; and, on the contrary, when by Froſt or very Cold weather this Air (by the abatement of its Spring) is contracted, the Quick-ſilver, freed from that preſſure, riſeth a little. But the Riſing and Sinking on this accompt, (as well that formerly, when this Air was in the Quick-ſilver, as that now, when it is gotten above it,) is not very conſiderable; hardly exceeding the twelfth part of an inch, or thereabout.

This Accompt I thought not amiſs to give you, becauſe it may poſſibly keep your ſelf, or ſome others who make uſe of Baroſcopes, from being impos'd upon by ſuch Obſervations; as if the Sun-ſhining or Heat of the weather did make the Air heavier than before; whereas it ſeems to be but an *accidental* operation upon that un-obſerv'd Air latent in the Quick-ſilver. And I thought it the more neceſſary to take notice of it, becauſe it is not ſo eaſily diſcover'd, unleſs by keeping the Baroſcope unalter'd for a longer time, than (perhaps) is done by ſome of thoſe, who make uſe of it; and, without which, I had not diſcern'd it my ſelf.

On this occaſion, I ſhall add another Accident, which I lately took notice of. Obſerving in the late hard Froſt, that the Quick-ſilver did not riſe a little, at ſuch time as, by reaſon of the fierce freezing, *I* expected it might; I did ſuſpect (as it prov'd to be,) that a little drop of water, (which was at firſt made uſe of for the cleanſing of the Quick-ſilver from the Air, and which hath ever ſince remain'd on the top of the Quick-ſilver within the Tube,) was frozen faſt to the glaſs, ſo as to ſtop the Quick-ſilver from aſcending: And, to try, whether it were ſo or no, I did a little ſhake the Tube by moving it up and down, ſo as to make the Quick-ſilver undulate. Whereupon I found the frozen drop of Water to keep its place, while the undulating Quick-ſilver did ſeveral times beat againſt it. And,

(which

(which is the thing, for which I mention it) the Noiſe upon theſe knocks was not ſuch a dull noiſe, as Quick-ſilver or other Liquids uſe to make in the open Air, by daſhing againſt Glaſs or Ice, or other ſuch hard Bodies; but ſuch a hard ſmart noiſe, as hard Metals uſe to make by knocking one againſt the other; or, as if this Ice had been ſo knock'd by a ſolid piece of Iron or other Metal of ſuch a bigneſs. Which difference of noiſe from what would have been in the open Air (where the intermediate air muſt firſt have been beat away, before the Quick-ſilver could ſtrike the Ice, and thereby the ſtroke of the liquid body obtunded or broken,) I attribute to that voidneſs of Air, which was between the Ice and the diſtant Quick-ſilver. And I remembred preſently, that the Honourable Mr. *Boyle* had formerly ſhew'd me an Experiment, very like this, upon another occaſion: which made me the readier to take notice of this; and I did it ſeveral dayes ſucceſſively. But when, by applying the heat of a Candle to the ſide of the Glaſs, I had melted this Ice, I found (as I expected) that within a little time the Quick-ſilver was riſen about a ſixteenth part of an Inch above what it was before; which the freezing of the Water had till then hindred it from doing.

My Thermoſcope, or Sealed Weather-glaſs, (which, having no communication with the Open Air, and ſo not being affected with its Weight, gives accompt but of its Heat and Cold;) hath, this laſt Froſt, been much lower than I ever have known it, upon *five* years conſtant Obſervation. Which proceedeth partly from the Extremity of the Cold, more than ordinary; and partly from the incloſed Liquor (being Spirit of Wine, tinged with *Cochineal*,) growing leſs ſpirituous.

It was firſt made in *Decemb.* 1664. In the Months of *January*, and of *February* following, we had very ſmart froſts, more cold than ordinary; when yet the loweſt mark, to which the liquor did ſubſide (in very hard froſts, and very cold wind,) was at inches $12\frac{1}{4}$: (at which time, $14\frac{1}{2}$ was froſt certain, and ſometimes at 15 and at $15\frac{1}{2}$:) The hight in Summer following, 1665, was uſually at 20, 21, 22, or thereabout; but in ſome few very hot dayes, at 25, 26, $26\frac{1}{2}$; (the whole height of the ſmal Cylindrick glaſs, whoſe cavity was about $\frac{1}{8}$ of an inch diameter, being about 20. inches; beſides a ſmall Spherical bowl at the top, of about $\frac{3}{4}$ of an inch diameter; and a bowl at the bottom, which contained the liquor, of about 2 inches diameter: the ſpace above the liquor being, at the firſt compoſure of it, voyd of Air, ſave what it had out of the liquor, which, being warm at the firſt putting in, fill'd the whole cavity, while the Glaſs was hermetically ſealed.)

The Winter following, the liquor ſeem'd to remain much about the ſame temper as in the next foregoing. For in *December*, *January*, and *February*, we had at $14\frac{1}{2}$ Froſt certain; ſometimes at 15. or higher; and the loweſt, to which it did that winter deſcend, was $12\frac{3}{4}$. The height, in the following Summer, *1666*. was uſually about 19, 20, 21; the higheſt of all, at 25.

About the end of *December* 1666, and the beginning of *January* following, it was, in hard froſty weather, at 12, 11, and once at $10\frac{1}{2}$, the weather being very cold, and the liquor (it ſhould ſeem) becoming ſome-what leſs ſpirituous, having evaporated ſome of its more ſubtil parts into the voyd cavity: and it was Froſt certain, that winter, about $13\frac{1}{2}$, (an inch lower than the years before;) ſome-times at 14, or $14\frac{1}{2}$. The uſual height in Summer following, 1667, was about 19, 20, 21, and the higheſt at $24\frac{1}{2}$.

The Winter following, it was ſcarce certain froſt at 13; but yet ſometimes at 14, or a little higher: the loweſt, to which it did deſcend that winter, (being very mild after Chriſt-maſs,) was at 12. And the following Summer, *1668*, uſually about 18, 19, 20; the higheſt of all (the heat of that Summer being but very moderate,) at 22.

The next Winter it was froſt certain, abour $12\frac{1}{2}$; but ſome-times, at 13. or higher: the loweſt of all, at $10\frac{1}{4}$. And in the Summer following, *1669*, the higheſt of all (being but a cool Summer) not much above 20.

But now this Chriſtmas, *1669*, though I find it to be froſt certain, about $12\frac{1}{4}$, and ſometimes at higher than 13; yet hath it come ſome-times lower than 8; and particularly *Decemb.* 26.

in the morning, to $7\frac{3}{4}$, and did not all that day come ſo high as 8. inches. Which being ſo much lower, than ever it had been in any of the precedent years of my obſervation, though it may in part be attributed to the diſ-ſpiriting of the liquor, yet principally to the extremity of the Cold.

It hath ever ſince been riſing, (but with ſome deſcent in the night-time,) and was on *January* 1, when the froſt ſeem'd firſt to relent, ſomewhat higher than 9; and is this day, Januar. 7, about $13\frac{1}{2}$. The Baroſcope at 29; but for ſome days before, it was about $28\frac{3}{4}$, (the weather having been windy and rainy;) and ſo it was in the froſt, about *Decemb.* 25, but then continued to riſe till about *Januar.* 2. to $29\frac{3}{8}$; but had been *Decemb.* 13. at $30\frac{1}{8}$; which is the higheſt, I have ever known it in my Baroſcope; $27\frac{7}{8}$ being the loweſt, that I have ever obſerved it in, (Octob. 26. 1665;) the moſt uſual hight being about 29, or ſomewhat higher.

But, though mine have been very rarely, and but very little, above 30, or lower than 28, (reckoning from the ſurface of the ſtagnant Quickſilver;) Yet in other places (according to the difference of Airs) it may by others have been found either higher or lower: and ſo likewiſe, according as the Quick ſilver, at the firſt filling of the inverted Tube, was more or leſs cleanſed of Air. For, a very little Air, left in the Quick-ſilver, and undiſcernable to the Eye, will, when it gets free of it, and remains in the voyd ſpace above the Quick-ſilver, ſenſibly depreſs the Quick-ſilver: And in the mean-time, (before it ſo gets free) will, upon heat of weather, make it ſwell.

An

An Accompt of a ſmall Tract, entituled,

THOMÆ HOBBES Quadratura Circuli, Cubatio Sphæræ, Duplicatio Cubi, (ſecundò Edita,) *Denuò Refutata, Auth. JOH. WALLIS. S. T. D. Geom. Prof. Saviliano. Oxoniæ,* 1669.

SInce Mr. *Hobbs* thought himſelf obliged to make ſome Reply to Dr *Wallis's* confutation of what he had, not long ſince, publiſh't upon this Argument; Dr. *Wallis* made no ſtay at all to return this Anſwer and ſecond refutation. Concerning which we ſhall give you a brief account, ſuggeſted by Dr. *Wallis* himſelf, of Mr. *Hobbes's* fundamental miſtake in his late Quadrature of the Circle, referring the Reader to the Tract it-ſelf for the *Figure*, which is therein the firſt.

Mr. *Hobbs,* conſidering, That, in caſe it ſhould *happen* ſo luckily (which was not neceſſary) *that* Q Y (the baſe of a right-angled Triangle Q Y A equal to the Sector L C A, and conſequently the Square Q R S T equal to the Circle B C D E,) ſhould, by the Arch C L, *be cut juſt in the midſt at* P; *then would, not only* (which to his purpoſe was neceſſary) Q P L, C P Y, *be equal each to other* (becauſe of A L P Y common both to the Triangle and the Sector;) *but more-over* (which was not neceſſary) *each of them equal to the half of* P A V, (ſuppoſing C A V taken equal, by conſtruction, to L A P:) all which is true, in caſe of ſuch a lucky hap:

And finding then (which is true alſo) *that this could not All happen, unleſs that interſection at* P, *were in the line* A O (drawn from the Center A to the middle of C G,) becauſe this muſt needs paſs through the middle of Q Y.

Concluded, *That it muſt needs ſo happen, or elſe it was impoſſible for Any right-angled Triangle, as* Q Y A (like to, and part of G C A,) *to be equal to the Sector* L C A: becauſe, *in any other, as* q y A *the interſection of* C L *and* q y *at* p, *would not be juſt in the midſt of* q y; *and therefore* (which he ſuppoſ'd neceſſary, but was not) q p A *not juſt the halfe of* q y A.

Not conſidering (which is his fundamental miſtake) that, if q p L *and* C p y *be equal each to other* (though neither of them be equal to the halfe of P A V, or of p A v; nor yet q p equal to the halfe of q y, nor q p A to the halfe of q y A; (*the Triangle* q y A *will be equal to the Sector* L C A (becauſe A L p y is common to both ;) *and like to the Triangle* G C A, *and a part of it*; which he thought to have been impoſſible.

Note

WHat in N°. 54 p. 1077. in the *Anſw. to Qu.* 1. is ſaid of the Obſervation of *Briners*, is to be underſtood, that the Workmen *think* ſo, that they make more Salt with the ſame quantity of brine, at the Ful Moon, then at other times, though really they do not, as the Anſwerer Judgeth by his *Obſerv.* in N°. 53. p. 1064: Who hath ſince advertis'd, that 'tis poſſible at times, when the Pit hath been much drawn firſt, that then, if without intermiſſion they go on *walling* till the *Full*, they may make at that time more Salt, than at another time, it being well known, that much drawing the Pit, ſtrengthens the Brine.

LONDON

Printed by *T. N.* for *John Martyn*, Printer to the *Royal Society*,
and are to be ſold at the *Bell* a little without *Temple-*
Bar, 1670.

Trans. Nº. 56.

Tar
Agout
Agout
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Toloʋse
Garonne
Laudot
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Fresquel
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Aude
Narbon
Gruissan
Liesse
Agde
Lake THAV
Cape Cette
Port S. Louis
Cap d'Agde
Scale of 4. Leagues, each of 4,000 Toises or Fathomes
W. Faithorne Sculp.

BRITISH MUSEUM
NATURAL HISTORY

PHILOSOPHICAL TRANSACTIONS.

Februar. 17. 16$\frac{69}{70}$.

The Contents.

A Narrative of the Conjunction of the Ocean *and the* Mediterranean, *by a Channel, in* France, *Some Conſiderations concerning the* Scarborough-Spaw, *together with a ſhort Accompt of a Salt-Spring in* Somerſetſhire; *and of a Medical Spring in* Dorſetſhire. *The Cauſes of Mineral Springs further inquired into; and the ſtrange and ſecret Changes of Liquers examined. Inſtances, Hints, and Applications, relating to a main point ſollicited in the* Preface *to this 5th Year, concerning the Uſe, that may be made of Vaults, deep Wells, and Cold Conſervatories.*

A Narrative

Of the Conjunction of the two Seas, the Ocean *and the* Mediterranean, *by a Channel, cut out through* Languedoc *in* France, *by the Authority of the Moſt Chriſtian King* LOUYS XIV, *and the Contrivance and Management of Monſieur* Riquet: *Engliſhed by the Publiſher out of the* French, *lately ſent to the ſame from* Paris, *together with the printed Mapp of the ſaid Channel here contracted, and explained.*

IT is not now, that the Conjunction or Communication of the Seas hath been thought poſſible. It hath been always agreed upon, that it was ſo, and *that* many ways, even within the bounds of *France*, without any dependance on or participation with the neighbouring Contrys thereof. The thing hath a'ſo been often propoſed under the Reignes of *Henry* IV. and *Louys* XIII. of moſt Glorious memory. But whether it be, that it hath ever been Judged too difficult or too expence-full, or that thoſe Great Princes were engaged in more urgent affaires, or that their Miniſters would not apply themſelves to it in good earneſt; ſo it is, that it hath been hitherto rejected, and as 'twere reſerved for the Glory of our preſent Great Monarch LOUYS XIV.

Monſieur *Riquet*, who long ſince had conſidered the thing by himſelf, having open'd it to the Lord *Colbert*, was happy enough to make him reliſh it, by ſhewing him the Advantages, which then might accrue to the Kingdom by facilitating Commerce, and by declaring to him the Difficulties, to be grapled with in this work, together with the Means of ſurmounting the ſame. This Great Miniſter, who inceſſantly watcheth for the Glory of the King, and the *Intereſts* of the State, and lets no occaſions eſcape of procuring them, ſoon acquainted his Majeſty therewith, who having a high concern for what may render his Kingdom happy and floriſhing, gladly hearkened to him, put the thing in deliberation, and having reſolved for it, gave a General Commiſſion to M. *Riquet*, eſteemed by his *Majeſty* the moſt capable Perſon for executing ſuch a deſign.

This difficulty being overcome, and M. *Riquet* having ſatisfied the Objections, made by ſeveral ſorts of people againſt this Enterpriſe, it was neceſſary, before the actual undertaking of the Work, to reſolve upon the Choyce, that was to be made of the two Ways, by which the Channel was to be carryed from the River *Garrone* to the *Aude*. Some of the Intereſs'd would have it carryed all along to the Plains, reaching from *Carcaſſone* to *Tholoſe*. Others would have it run into the river *Freſqueil*, from thence into the Plain of *Revel*, and thence into the river *Agout*, and ſo into the *Garonne*. M. *Riquet* follow'd neither of thoſe two Ways, but form'd thence a third, which was; To make uſe of what was beſt in theſe two Ways, by taking from the former, what it had of good convenient Country from the *Point* of *Separation* (deſcribed below) to *Tholoſe*; and from the latter, what advantage the bed of *Freſqueil* would afford him; yet ſo, that whereas ſome pretended to make this Channel of Communication paſs into the very Channels of the little rivers *Lers*, *Freſqueil*, *Aude*; Monſieur *Riquet* maketh his Channel paſs, as much as he can, in the adjacent Plains, leaving the ancient Channels of thoſe Rivers to ſerve for receiving and carrying away the great and frequent inundations of waters, and thereby ſecuring the new Channel from the danger of being inconvenienced by them.

The higheſt place of the whole Channel was well enough known, which was to be the Point, call'd the *Point* of *Diviſion* or Separation. Nature herſelf ſufficiently pointed at it by the *Spring* of *Grave*, which partly runs towards the Ocean, and partly towards the Mediterranean: and 'tis near this place, where the great *Baſon* is made to receive the waters, that are to run both ſides of the Channel. But this water being not near ſufficient, it was neceſſary to find out others, that might be high enough to fall into the ſaid *Baſon*, and abounding enough to keep it always full, and to furniſh for the *Sluces* of thoſe two parts of the great Channel.

It appear'd alſo, that this plenty of waters could not be had but from the *Black-Mountain*, diſtant enough from it; but it did nor appear, how this could be effected. In ſhort, 'tis this wherein the greateſt difficulty of the whole work did conſiſt. For we muſt know, that there are many Springs iſſuing from the higher part of that Mountain, and that among the reſt there are Five great ones, which make as many ſmall rivers, that are never dryed up and run along the hillocks of this Mountain, and fall together into the river *Freſqueil*; but ſo far above the ſaid *Point* of *Separation*, that that remoteneſs would render them abſolutely uſeleſs, it not being poſſible to make them re-mount. Wherefore to make them ſerve for this purpoſe, it was neceſſary to interrupt their natural courſe from *North to South*, and to give them a contrary one, from *Eaſt* to *Weſt*, by digging a Conduit for them croſs the Mountain, through places, which are all ſteep rocks and horrid precipices. There was then a neceſſity to make thoſe *five* rivers run, the firſt into the ſecond, and the ſecond into the third, fourth and fifth, and to re-unite them all in the *Deriving Channel*, which at laſt carries them to the *Point* of *Separation* for the end above-mentioned.

As for the particulars of this great Work, the annexed *Mapp* will give farther information of them. In it

A. The Point *of* Separation, *being beneath the Town of* Mont-ferand, *near the high way of* Tholoſe, *below the Stones of* Naurouze. *It is ſo called, becauſe that from this place the waters run naturally, on one ſide, to the Ocean, by the* Garonne, *and on the other, towards the Mediterranean, by the* Aude. *In that place is to be a great* Baſon, *Octogonal Oval-wiſe,* 200 *fathoms long, and* 150. *fath. large; which ſhall be ſurrounded with* 72. *houſes to be raiſed on Arches: Over againſt which there ſhall be built a key for the convenience of thoſe that ſhall dwel there, which is to be very ſpatious, and faced with hewen ſtone. This great Baſon ſhall receive all the waters, which the* Deriving Channel *is to conveigh thither from the* Black Mountain, *to be diſtributed by the Royal Channel to both Seas. In the middle of this Baſon ſhall be a* Coloſſe, *repreſenting the King ſtanding in a Triumphant Charret, drawn by four Sea-horſes, holding one foot upon a Globe, and a Trident in his hand, as marks of his greatneſs both by Sea and Land. And then a ſtreame of water, iſſuing as from a Source under the Charret ſhall as 'twere be beaten back, and diſgorge it ſelf through the throat of Serpents toward the four parts of the World, repreſented by as many Rivers, which ſhall alſo poure out of their urnes a prodigious quantity of water, to ſhew, that the Graces, which the Liberality of the King plentifully diffuſes to all his people, do paſs through the hands of the Lord* Colbert.

B. The Stones *of* Naurouze, *lying on the left hand of the high way of Tholoſe on the ſide of a little hillock.*

C. The Fountain of Grave, *whence the waters run partly to the Ocean, partly to the Mediterranean.*

D. The Black Mountain, *on which there is a great Forreſt, called* Remonde, *ſo pleaſant in Summer, that the Counts of* Tholoſe *did heretofore paſs there that whole ſeaſon in the divertiſement of Hunting. It was from hence, that it was found poſſible to make this Channel, by the means of the Five Rivers and a great number of rivolets, iſſuing thence; without the concourſe whereof it had been impoſſible to undertake it and to render it navigable. It is in this Mountain, a good way under the Mill of* Calz, *on the river* Sor, *where begins the* Channel of Derivation, *which hath its declivities through terrible precipices, where it receives the rivers* Bernaſſone, Lampi, Rietor, Alzau, *and* Lampillon, , *to conveigh them into the Magazine of St.* Feriol, *by the means of an other Conduit, when need ſhall be to fill it. It would be troubleſome to relate all the pains, which this Channel of Derivation, almoſt all cut through rocks, hath coſt; or the number of* Dams, *that were neceſſary to be made athwart many rivers, to divert their natural courſe; or laſtly the Mountains, that were to be levelled, having been counted afore inacceſſible rocks, and affording now agreable walkes.*

E. The Channel *of* Derivation, *digged in the Black Mountain, and receiving all its rivers.*

F. The Place,whence the ſaid Channel *diſcharges itſelf into the river* O

G. Another Channel *of* Derivation, *conveighing the water of the Black Mount into the* M*agazin above-mentioned.*

H. The Magazine *of the Water of St.* Feriol. *This Work might be reckoned among the Wonders of the World, both for the Contrivance of its admirable Structure, and for the prodigious quantity of Water, it is to contain. For ,it will be above* twelf-hundred *fathoms long,* ſixhundred *large, and* twenty two *,deep ; and is to furniſh every minute of an hour, for ſix moneths of the Year, more than eight Cubic feet of water.* This *vaſt Store-houſe is between* 2. M*ountains, through the middle of which runs the ſmall rivolet* Laudot. *'Tis true, Nature hath done ſomething wonderful, in forming a diſpoſition thereto; but 'tis alſo certain, that Art hath much ſurpaſſed her, by the ſtrong Banks or Dams, which are there rais'd to bear up againſt ſuch a vaſt quantity of water; as alſo by the admirable Aque-ducts, that are to have more than* 80. *fathoms in length, for giving the more liberty and facility to the waters to run out, when there ſhall be occaſion; and laſtly,* by *the great Wall, which is* 22. *fathoms high, and* 600 *fathoms long: to ſay nothing of the incredible quantity of Earth, which* 2000. *Woemen daily carry to this wall, thereby to ſtrengthen it on both ſides.*

I. *The natural courſe of the river* Audot,*which by the means of a Channel conveighs the Water of the ſaid Magazin to the Cape of of* Bon Amour, *where it joyns itſelf with thoſe, that come from* Revel *to go to the river* Sor, *to paſs together to the Point of Diviſion.*

L. The Cape *of* Bon Amour, *ſo called by reaſon of the two Channels; where the one, coming from* Revel, *brings the waters, which went to the Ocean, and the other, which comes from the Magazine, brings thoſe of the Black Mountain, that paſs'd towards the Mediterranean.*

M. The Port Louys *near* Revel,*newly built, faced with hewn ſtones of* 20. *fathom ſquare; where the Lord* Bourlemont *Arch-biſhop of* Tholoſe, *and M. de* Bezons,*Intendant of Juſtice in* Languedoc, *accompanied with many of the Nobility, embarqued in* May 1668. *to make an Experiment of this litle Channel, and rowed on to the Stones of* Naurouze, *with that ſucceſs, that M.* Riquet,*having found the advantages, which the neighbouring Towns and Villages might thence receive, beſides that of carrying the waters to the* Point *of* Separation, *did ſo enlarge the ſame, that now it carryes great Boats, though it be on the declivity of an Hill: whith cauſeth wonder in all thoſe, that ſee it.*

N. The Channel, that goes from Revel *to the Point of Separation.*

O. The Royal Channel, *which goes from the* Garonne *into the* Lake *of* Thau *or* Frontignan. *It is to be in its narroweſt places* 9. *or* 10. *fathoms broad, and at leaſt* 9. *foot deep, according to the places, where it muſt be more or leſs digged. You may ſee in the annexed* Mapp *a great many rivolets, rivers, and Ponds, which it traverſeth, and which in winter are as many* *torrents, that would cauſe very great inconveniences, if it were not for the care uſed to prevent them. The Boats that ſhall come from the Mediterranean, ſhall enter at the Port St.* Louys,*which is at the* Cape *of* Cette; *and thoſe that ſhall come from the Ocean, ſhall paſs to* Bourdeaux: *they ſhall aſcend by means of Sluces unto the* Point *of* Diviſion,*and deſcend from thence after the like manner. The number of the Sluces will be great, becauſe of the great declivity, there is from the ſaid Point towards both Seas. In the Mapp are noted thoſe only, that are made from* Tholoſe *unto the* Point *of* Separation, *whilſt we are buſy in marking alſo thoſe on the other ſide with the ſame exactneſs.*

7. *The mark of the Sluces.*

Some Conſiderations

Relating to D. Witties *Defence of* Scarborough Spaw (*abbreviated in* Numb. 51.) *together with a brief Accompt of a leſs conſiderable* Salt-ſpring in *Somerſetſh*; *and of a Medical Spring in* Dorſetſhire; *by the Learned Dr.* Highmore *in a Letter to Dr J.* Beale *at* Yeavil *in* Somerſetſh.

Worthy Sir,

I Give you many thanks for the laſt Letters, and the loane of your Book. The Dr. indeed hath gotten ground of his Adverſary; but whether either of them hath gotten the right on his ſide, I cannot Judge, being a ſtranger to that Water, much differing (it ſeems) from theſe about Us; and therefore may participate of other Minerals, and more, both in quantity and number. But, whether all thoſe diſtinct Minerals, reckon'd up by the Dr, do conſpire to make up this Medicinal water, and that none of them can be left out, may be doubted: And it ſeems, he doth himſelf ſpeak very doubtfully as to Salt; acknowledging it to be the leaſt of all the other, if there be any differing from the Salt of the Metals; though it be ſometimes covered by the Sea, as he ſaith pag. 89.

Next, I wonder, why he ſhould ſet *Allom* in the front of the Conſtituents of his Medicinal water: *Alumen exiccat, aſtringit, incraſſat.* Now how the Water ſhould be ſo highly deopilative, and ſo beneficial to Hypochondriacal and Cachectical perſons, being impregnated with ſo great an Aſtringent, I underſtand not, neither doth the Dr. declare: Beſides, he confeſſeth, Allum-water will not tinge with Galls as he acknowledges *this* will do.

Further, why he ſhould make *Iron* and *Vitriol* two diſtinct Mineral Conſtituents of this Water, and call it *Ferrum Vitriolatum*, I do not ſee: As if Vitriol were a ſtranger to Iron, or that they were here two diſtinct Minerals; when indeed Iron alone will ſupply both. Vitriol is the Salt of Iron, and there is no Iron without it. And that Vitriol, which he ſaith is found alone in the Rocks near this Water, will by the Summer-heat be hardned into Iron, which in a forge will melt and run. So that, though Vitriol may be found alone without the Iron-ſtone, it is not becauſe it is no Ingredient in the Compoſition of Iron, which cannot be Iron without it; but becauſe thoſe Vitriolin Earths are not grown to that perfection, but either by ſome accidental mixture of other Bodies is clapt up into the Compoſition of ſome other Mettal or Mineral; or elſe wants thoſe Bodies, or time, that ſhould fix it into Iron.

And truly that opinion of Learn'd Dr. *Jordan*, that Waters are tinged by Minerals while they are in *fieri* (though it ſeems to ſome ridiculous, as importing, that they ſhould remain for many hundreds of Years in the ſame imperfect ſtate,) may yet have much of truth in it here. And what can the Water receive from a perfectly wrought and mixt Metal, in its paſſage by it? But when the whole maſs is *in ſolutis principiis*, no part fixt by its neighbour, but every one at liberty, the water, paſſing through, may eaſily lick up ſomething of every Body diſſolveable in it. And that theſe Bodies may continue in this State of Liberty for many years, without a *copula* to fix them into ſuch a Metal, is not a matter either un-intelligible or ridiculous. The Salts in the Earth may combine with different Bodies, and make up ſeveral compounded maſſes, which yet, when diſſolved, may communicate the ſame properties. The Vitriol of Copper makes water acid as well as that of Iron.

But it is not my buſineſs to undertake the quarrel; only I muſt note, that his Colouring of Roman Vitriol *pag.* 21. is erroneous. Note, that Vitriol was omitted in the Print of *Numb.* 51. p. 1039. l. 40.

In the 120th pag. he is diſſatisfied, that his Adverſary allows the Saltneſs of the Sea to proceed from the Foſſile Salt; or from ſuch Rocks and Bodies of Salt which are often found in the Sea;

beſides the Saltneſs diſperſed throughout the whole Body of the Earth, eaſily imbibed by water. He will rather allow the *Peripatetical* Torrefaction by the Sun to be the Cauſe; which ſeems very improbable: For, the Suns heat cannot act more powerfully on water to this Effect, than Fire doth; yet this will never give ſaltneſs to water, that is not already impregnated with ſaline particles. And his Argument againſt his Adverſary ſeems not convincing; namely, That it ſhould, if made by Foſſil Salt, kill all Fiſh, as well Sea-fiſh, and Freſh-fiſh; for ſo, *ſaith he,* Salt put to freſh water doth. As the matter of Fact is not evident, that Salt put to freſh-water ſhould kill Sea-fiſh (the contrary of which I have experimented in Oyſters;) ſo it ſeems not probable, that the Salt, which was lately imbodied with the water in the Sea, and was then natural to Fiſh, ſhould, after its ſeparation and reunion again in the like proportion, prove ſo fatal. That the Salt of Sea-water and Salt-ſprings is the ſame with Foſſil Salt, will be no hard matter to ſhew. The Inland Salt-ſprings do receive their Saltnes from this Salt, or from nothing elſe that coms within our imagination. From the Sea it cannot be ſuppoſed to come at ſuch remote diſtances, as we do frequently find it.

Concerning the Salt-ſpring at *Eaſt Chenock* in Somerſetſh. I ſhall tell you, That the laſt week, being at Mr *R's.* houſe, I made tryal of that Salt-ſpring, above 20. miles from the Sea; which, though not ſo ſalt then (by reaſon of the late Raines) as in Summer, yet from a Wine-quart, by Evaporation, we obtained near 80. grains, part of which I here ſend you. Neither can theſe Springs be ſalt from the Suns Torrefaction, ſince they lye no nearer to the Sun's force than many other Springs about them; which yet continue freſh.

Moreover, if I may gueſs at the Ingredients of thoſe Waters, which we call *Chalybeate*, aud particularly of this at *Farrington* in *Dorſet-ſhire*;* I think them to be impregnated principally from the Vitriol or Salt of Iron, which is very Volatile; ſo that little of it can be found, by evaporation of a great quantity, or from the precipitated ſediment. The proportion of Salt in this Water I found after this manner. I put 4 ounces of ordinary clear water into a Glaſs,

and

* *Which is the ſame, that was, by a miſtake, ſaid (in* Numb. 51. p. 1039. l. 2.*) to be at Stalbridge in Somerſetſh.*

and impregnated it with a known proportion of Gall: then by degrees I let fall into it the Salt of Iron, until I found it thereby as deeply tinged red, as the ſame quantity of *Farrington*-waters would be by the ſame proportion of Gall: The quantity of the Salt of Iron, that performed this, was near two grains. This water, ſo tinged, taſted and ſmelt juſt as the natural water from the Spring with Gall did: If I added a greater proportion of Salt, it would make it nauſeous and Emetical. *Sherborn*, Decemb. 17. 1669.

The Cauſes of Mineral Springs further inquired: And the ſtrange and ſecret Changes of Liquors examined; by Dr. J. Beale, *to the Publiſher.*

Sir;

I Am much obliged to my honored Friend Dr H. for his *Analyſis* of Mineral Springs, and his Animadverſions relating to that Argument. I offer no Objection againſt the Note, that ſome Waters do lick up the Salts, before they be perfectly fixt in the Materials of Metals: Only this I humbly propoſe for further Inquiry; Whether ſome Waters, by their long paſſage through ſub-terraneous ſteams of divers kinds, and by heats and coolings, and by many changes of theſe, and by ſeveral kinds of ſtrainings, by colliſions, and manifold alterations of the contexture of their minute parts may not firſt acquire ſome Metallin Tincture; and thence aſſiſt the Generation of Perfect Metals, if they meet with fit materials; Or if they ſhould be further concocted, before they be intercepted by opening the Spring? If this may ſometimes fall out, then we may in ſuch caſes avoid the difficulty of undertaking, that Metals, there continued hundreds of years, are imperfect and in *fieri*. And perhaps the *Chalybeat* and other Metalline Spirits may be purer and more throughly deopilative, before they be embodied into firm Metals, than after they are by Fire extracted. And then this may be a ſecret cauſe, why ſome Springs prove effectually Medical, when other Medicins do faile.

Learned *Varro* ſaith, *Tellus Mater omnium.* And we can eaſily apprehend, that all ſolid Bodies, even Gold and firmeſt

Jewels, though they ſeem ſtrong enough to hold out a Platonical Revolution, do nevertheleſs naturally tend to a Terreſtrial Diſſolution. And ſome of the Antient Philoſophers have conceived, that *Water is the Mother* to Earth itſelf, And they ſeem to have the greateſt Authority, as well as good Reaſons on their ſide. And Honourable Mr *Boyle* hath by choice Experiments taught us, that Water may have her turn to put in her claim for a Maternal right; and to be as much a Principle, as any of the other which we call Elements. And it ſeems to hold a kind of Middle Station between Earth and Air; apt to be condenſed into the former or to be expanded into the latter; and to have a nearer allyance to running Metals, ſplendid Gems, and tranſparent Minerals, than Earth can have.

But *Tachenius* in your *Numb.* 50. offers more cloſely, the *Various Salts*, eſpecially of the *Alcaly*'s, and Acids, to be the Principles of all mixt Bodies. I cannot doubt, but that they are generally neceſſary Ingredients and powerful Agents for Generation: And perhaps there are as many kinds of Salts, as there are Earths, Minerals, Stones, Metals, Vegetables, Taſts, &c. from the ſweeteſt Sugar to the moſt diſpatching *Menſtruum*; Yet many of them by their expedit Volatility, and ſome by by their inclination to unite firmly with water, as in Glaſs, do ſhew a more than ordinary congeniality and friendly agreement with the pureſt liquids, Air and Water.

But to decline intricate Theory's, and therewithal the ſubtilties and difficulties of determining, Whether Salt or Water be the nearer or more original Principle; or the more copious, more active, or more influencing in this or that Body: This we have before our eyes; The Birch and Alder feed more kindly on a thin uliginous moiſture, the Elme, Pine, Firr, Pitch, and Cypreſs, chuſe a ſtronger liquor; yet theſe and many more of the wideſt difference, are ſometimes ſeen to draw their whole ſuſtenance, bulk and ornaments, whether annual or perennial, from the liquors they find in the ſame piece of ground, and from the ambient Air, and Dews; when as yet by our beſt diligence we cannot diſtinguiſh the Liquors or Salts cloſely approaching their ſeveral Roots. And we may exchange all the Earth totally from the Roots of Trees, whoſe Barks, Sap, Fruit, and

Seed have very much differing Salts; and are of very different kinds; and yet ſee each Tree proſper the better by the Exchange. Hence we may ſuſpect, that the very contextures of their Bodies, from the firſt ſpirting of their ſeed, and as they are form'd gradually from the Inviſible Principles or Spirit and vigor of their Seeds, however ſmall and imperceptible, are the *natural Limbecs*, where the common Raine, Water, and Air, are digeſted into very much differing Leaves, Fruit, Seed, Reſins, Gums, cooling Julips, &c. perhaps as the Cow's belly converts the common juyce of all ſorts of Graſs into Milk; or as the Bee ferments the dew of all Flowers into Hony and Wax.

We ſee alſo, that an handful of Moſſe, ſometimes above a ſpan long, and reſembling Vegetables, growws out of a ſmall Oyſter-ſhel, without Earth, dirt, or ſand for the relief of the Root; Trees out of bare Rocks, and the annual attire of Harts and Bucks out of their bony Heads. Whence we may eaſily apprehend, how the Seeds in their time, and afterwards the Roots, Stems and Leaves of Trees, may be the proper Strainers to generate the peculiar Saps and Juyces; and perhaps to ferment and boyle the Liquors into their ſeveral Salts. It may paſs for a reſemblance, if not for an inſtance, that the Juyce of ſome ſweet Pears may be dryed into a very ſweet Sugar; and the Juyce of ſome other Pears is ſo fierce, that at the very opening of the Rind with the teeth, it doth almoſt ſuffocate, as if it would kill dead immediately; and yet this Juyce by time and ſeaſonable maturation becoms ſweet, winy, and luſcious. And we hear of divers Exotick fruits that will kill outright; and that ſo quick, as may challenge the fierceſt *Menſtruum* of an expert Chymiſt. Now, as the Horns of a Stagg have their whole growth aud vertue from the protruding Bloud and Spirits of the Animal; the Moſſe (as by the Microſcope appears, when withered) from the inward ſhel of the Oyſter and the Marine Water; ſo in Plants, the Sap may by Heats and Coolers, and other changes in Summer, Autumn and Winter, by Winds, and compreſſing Air, be hardened into the Timber, Seeds and their Stones and Kernels. All ſeems to be but Sap at the firſt draught, or little elſe beſides pure Air and Water, till theſe be concreted into peculiar Salts by more curious Strainers, and by more ſubtil Boylers than Art hath hitherto deviſed. And with no leſs probability Mineral Waters may acquire their proper Salts in their ſubterraneous paſſages by their Strainers and Conveyances, by the various Temper they meet with, and by their daſhes, and following changes of contexture. But this I leave to further inquiry.

And this was my Ayme in your Tract 43. p. 855; where by a ſlight and curſory alluſion I compared the Motion of Sap in Vegetables to the deſcent of Liquors in an Alembick. I had no thought of ſquaring the compariſon to agree in all circumſtances. And here alſo I pretend to very little more than alluſions all along. It requires deeper work, a larger compaſs, and a cloſer attention to eſtabliſh a General Theory upon the Intrigues of Vegetation, and of all Saline Operations: The very Air may (for ought I know) afford ſtore and variety of Salt to daſh the Foundations of my Overtures, at leaſt as far as pertains to Vegetables. And the Mineral Salts have their receſſes deeper, than I can dive, and their activities are ſwifter, than I have skil or leiſure to trace.

Neither had I any phancy, that the Sap in Winter deſcended to the Root, ſince I ſaw an Aple-tree, that yielded 4 or 5 Hogſheads of ſtrong Cider yearly; and a Pear-tree, that yielded more Perry; yet both growing on a dry ground, where they could get no other liquor then what the Clouds and the Air afforded: Yet I conceive, that theſe Trees have an intercourſe of peculiar Spirits ſome way linked together, and vigorouſly co-operating, from the very Fibers of the loweſt Roots to the Top-leaves. And of this I had ſome waririneſs, when I expreſſed the correſpondence between the Timber and Seeds in theſe terms—*more immediate and peculiar*, Numb. 46. p. 920.

But I have no fondneſs for thoſe Notes, which bear my name in your *Tracts* of N. 43. and 46; They were haſtily dictated, neither reviewed, nor fitted for the publick; otherwiſe I ſhould have promis'd leſs and perhaps prov'd more. If the Impertinences, Incoherences and diſlcolations may be pardon'd, I can ask no other favour for thoſe Scribles. *Inſtan-*

Inſtances, Hints, and Applications, relating to a main point, ſolicited in the Preface *to this* 4th Vol; *concerning the uſe may be made of Vaults, deep Wells, and Cold Conſervatories, to find out the Cauſe, or to promote the Generation of Salt, Minerals, Metals, Chriſtal; Gems, Stones of divers kinds; and helps to conſerve long; or to haſten Putrefaction, Fertility of any Land,* &c. *by the ſame D.* Beale, *in another Letter to the Publiſher.*

Sir,

I Shall here collect from your own Tracts, (with a brief touch from my own Obſervations and Readings) a few Hints, pertaining to your Solicitations in your *Preface to* this 4*th Vol.* N. 45. pag. 8*96.*

1. Our worthy Friend, Mr *Evelyn*, in his *Sylva*, as it is now moſt excellently improved in his 2d Edition, C. 3. p. 26, reciteth, that a certain Oak was found buried ſomewhere in *Tranſylvania*, near the Salt pits, intirely converted into an hard Salt. He adds, that this Experiment, if true, may poſſibly encourage ſome other attempts for the multiplying of Salt. *Thus he.* And hence I hope, I may be excuſed for my Inquiſitiveneſs after Salt-ſprings; which however weak, may poſſibly ſometimes Indicate more Foſſile Salt than is drayned or approached by that particular Spring. And Sr. *Hugh Plat* in the beſt Cabinet of his *Jewel houſe* c. 104. rebukes our lazy Engliſh for neglecting the rich and fertilizing Quality of our Brine, which encompaſſeth our Hand, and meets us at the foot of ſome of our Hills. Some indeed in the *Weſt* do make uſe of brackiſh ſand, and do find a good reward when they bear the charges of carrying it far, for the enriching of their Inheritances; whilſt other Ruſticks will not be intreated to accept of the Brine they have in the midſt of their own Grounds. Certainly the Saline ſteams are carryed by the Air and Wind much farther from Salt itſelf in heaps, or veſſels, than from the Sea water: From whence the Dews, which ariſe in vapours, do deſcend as ſweet and pure as the Dew which aſcends from the Earth; and the Rain ſhews no difference. And I gave you

once an Experimental proof, that either the Saline ſteams, which aſcend from a heap of Salt, do pierce through very thick ſtone-walls; Or (which I did much rather conceive,) they generate more Salt, to a great depth of thickneſs, in the Lime and Mortar of the Walls.

2 Dr *Power* in his *Microſc. Obſ. pag.* 62. aſſures from good Teſtimony, and common experience, that a Mineral heat in the Subterraneous parts produceth Minerals: And particularly, that in Allum and Coperas-mines, thoſe Minerals being broken, expoſed, and moiſtened, will gather an actual heat; and produce much more of theſe Minerals, than elſe the Mine would yield. And there he further proves by an unlucky accident, that Braſſe-lumps, (which he ſaith is a kind of Marcaſite,) being layd in heaps and expoſed to the moiſt Air, or ſprinkled with water, will ſmoak, and grow exceeding hot; and ſometimes take fire, and burn all that is about them. *Thus he.* And all ſorts of Dung afford a Heate, ſome leſs, and ſome ſtronger; ſome ſpeedily, and ſome more permanently. And ſtore of Nitre may be had from the ſweepings of the houſe, any kind of aſhes, ſhovelings of any ſordid place, the cleanſings from the back ſtayrs, and emptying of the Chamber-pots, if always caſt as *ſtratum ſuper ſtratum* in a dry Well, or Vault, only ſo covered and fenced, that the Rain and water gets not in. Dr *Power* ſhews here, How Metals or Minerals may be generated; but how far this Generative force will run, and from what Bulke of Materials; and what Materials are apteſt to be transformed into what Minerals or Metals, we muſt refer to further tryal. Of this we are certain, that by a ſtrong Fire, thus raiſed by Braſs-lumps, Stones and Metals may be vitrified, and thence aſſume another Nature, and Luſtre than is ordinary; And by the Gentler heats, (beſides the acqueſt of Salt-peter in the end) there may be Mechanical applications peculiar for the Gradual and ſlow productions of Chymiſtry, both for natural effects upon uſual Proximities, and for Artificial Contrivances.

3. In your *Num.* 6. p, 101, you ſhew us, that there a is place in *England*, where, without petrifying water, wood is turned into ſtone, in a Sandy Earth. But can we yet ſay, whether Vaults digged in ſuch Grounds may not have a Petrifying Spirit, as

there is a faint and ſlow Petrifying Spirit in *Ookey* Rock near *Wells*, and, as I hear, in ſome other Rocky Vaults in *England*, and elſewhere? Or do we yet know, what will more eaſily and ſpeedily, and what more difficultly, be turned into a Stone? Or what the differing effects may be from the ſeveral kinds of Materials? Whether Bones, or Horns, or *Album Græcum*, &c. may not here be turned into *Oſtea-Colla*, or to a better Improvement? And they, that have the command of Petrifying waters, may make ſuch and many other tryals for conſiderable Diſcoveries in Philoſophy. I know a Rock in *England*, which hath a Hole ſo deep, that the Neighbours do report and generally believe, that it is bottomleſs; And a ſtone may be heard to daſh from ſide to ſide a pretty long time. Some Philoſophical uſes may be made of ſuch deep holes. And the ground, which bears the fair ſtones, called *Aſtroites*, about *Belvoir-Caſtle* in *Lincoln-ſhire*, and that which bears the little Diamonds near *Briſtol*, and where the ſtones of peculiar figures, as of *Helmets, Scalops, Cockles*, &c. are found frequent on the ſurface, digg'd up in heaps, in ſuch places the ground may be tryed, both rayſed in Hillocks and ſunk into Vaults.

4. I have by experience found, that there are ſome Vaults of no great depth, not at moſt above 4 or 5 feet, that will ſpeedily diſſolve ſtones, and releaſe from the ſtony Ligature. Of this I reſerve for you a further accompt; For I am already tedious, and this would involve into many Circumſtances hardly Credible; whereof one is this, that being expoſed to ſome aſſaults from the keeneſt Northwinds, it never yielded to the freezing of any thing placed there in the hardeſt Froſts of this year, or of the years 1663 and 1665: as if the Petrifying Spirit had ſome affinity with a long laſting Infrigidation, ſince that which unfoldeth the Petrifying Ligature, by the ſame property reſiſteth Froſt alſo. So one would imagine: But by common Experience we know, that Froſts with Snow and Rain will diſſolve many kinds of ſtone, and a very rich Marle, which for one, two, and ſometimes more winters holds out againſt all weather, and looks all over very like greety ſtone. Chalk is a pregnant Compoſt for ſome Lands; the Froſt and Snow will diſſolve it, and make it run into good manure, when the Summer-heat with all the Summer-rain cannot diſſolve it.

5. You offer ſomething that may pertain to this purpoſe in your Tract of N. 49. p. 982. concerning the Generation of Chriſtal. And I think, I could ſhew, by a train or liſt of proofs, a ſtrong probability, that, as Heat vitrifies, ſo Durable Froſts, with ſome Concomitants of like nature, by ſome alternative oppoſitions of Heate, or perhaps by coincidence of extreams, do Chryſtallize, or more firmly Petrify the moiſture or ſweat of Rocks and Quarries. The petrifying ſpirit criſpeth by an acuter angle into a firmer ſolidity, than can be performed by any Froſts to us known. And the Marcaſite is formed by a conſtipation ſtronger than that which petrifyeth; and ſometimes where Marcaſites are generated, there are found alſo ſome parcels of very pure, firm, and ponderous Copper, which requir'd a ſtronger Compreſſion, as by an acuter Angle, for the Generation of the Copper, then for the Generation of the Marcaſite is neceſſary.

6. And that Froſts alſo alter the Nature of Liquors, we had now ſome experience in this ſnowy ſeaſon: For we ſaw the water of diſſolved *S*now perform a quick cure, in taking out the fire, when the fleſh was burnt by a warming pan of Braſs; which Metal commonly makes the burning more difficult to be cured: Which did put me in mind, to examine the figures of the *S*now, which now fell in this extreame Froſt. I expected, that we might ſee through the ſmall particles, at leaſt as through Lice, Fleas, Cheeſe-mites, &c. by ſome kind of tranſparence; but I was deceived: My aſſiſtants could make nothing of it, either by an ordinary or extraordinary Microſcope. I was invited to the Inquiry by your N. 39. p. 774. reporting, that in *Germany*, March 1666, or about that time, *S*now fell there, having the ſhape of Pillars, ſome Tetragonal, and ſome Hexagonal, with a neat Baſis, and a larger head, as in Columns. Perhaps a more skilful ſearch by the beſt Microſcopes may diſcover, either in what ſhape the Rorid particles are, when they are frozen into *S*now, or into what figures or Angles the particles of the *S*now are compreſſed by Froſts. If the Clouds were continued an intire body of water, they could not quite hinder the ſight of the *S*un and *S*tars; for a good depth of clear water will not hinder it: but the particles, being divided in the

Clouds, it muſt needs hide the Sun from us; as ſuch a depth of *foame* and Snow would do. But in this *Paragraph* I would hint the change, and beneficiall Improvement, that may be made upon ſome Liquors by meer Froſts, by Chryſtallizing, and perhaps more by Petrifying Vaults.

7. I obſerv'd a Spring, that in all the extreame Froſts, that have been theſe ten years, hath yielded a ſmall ſtream, which running over a large Tract of Paſture, keeps all the bankes and borders Green, and free from freezing, diſſolving the Snow, and ſmoaking all the way where it runs. And this warming force it holds for 4 or 5 foot on each ſide, wherever it runs, till the very ſmall ſtream falls into a little Chanel. Hence I would offer, that ſome better uſe may be made of ſuch ſtreams for Hortulan Entertainments, and for many Philoſophical uſes, if well conſidered. The Sober Water-drinkers, who are addicted to cleanlineſs, and a ſimple Diet, may by the ſmel and taſt diſcover, and fore-warn of the great Diverſities of waters; which are more or leſs Petrifying, and which more powerfully diſſolving petrification; which aſſiſts Nutrition, and which is more Jejune. Yea perhaps by Aſſiduity and Inſtructions they may Indicate by Springs, and the ſteams of Vaults, much of the Treaſures of our Hills and Mountains; and of all the Subterraneous World. We trayn up Setting-Dogs to find Partriges, but we neglect the Ayd, that may be had from Inquiſitive men for the finding out of Springs for Bolus's, Salts, Minerals, Stones, and Metals; For Health, Accommodations, Ornaments, and wealth. You ſee here, how by Vaults and deep Wells, furniſhed with proper Materials, and ſo covered, that by apertures wider, and ſmaller at pleaſure, we may find the effects of Air in the entrance, and by the rebounding returns, and by mixtures with Subterraneous Steams many effects, which will hardly appear by any contrivance of the *Pneumatic* Engine: As to try, what the Mineral ſteams of all kinds will operate upon all ſorts of Materials, when they are ſtrained by the driving and rebounding Air through ſtrait and winding Orifices of various ſhapes, wider and narrower? Whether the Barkes or Timber of Trees are more apt to receive the Saline or other ſteams? And whether the common Saline ſteams may not be appropriated to o-

ther vertues by the ſeveral kinds of Barks &c? The *Tanners* know, that the Bark of ſome Trees hath much more Salt than the Timber: And generally where the Barks have the ſtronger or finer reliſh or Vertue, the Wood hath very little. The wood of the *Cinamond*-tree is Inſipid; And the wood of *Guaiacum* hath not halfe that vertue which the Bark hath. But in theſe trials we ſhould take heed of a danger from the compreſſed ſteams. And if we would uſe a deep and dry Well, for ſtrong heate by Marcaſites, or otherwiſe, we ſhould remember Mr *Boyle*'s proofs of the Incredible weight of the Air, and provide very ſtrong Arches and thick Planks for the Coverture, before we adventure to ſtop in the Air, when it is highly rarifyed by ſuch heates.

8. But that which chiefly encouraged me to give you theſe remarkes of the operations of Froſts and Cold, is this. It growes in faſhion to make *Conſervatories* for *Snow* and *Ice*; and Mr *Boyle* hath layd ſuch deep Foundations to find out the Nature, propertyes, and effects of Cold and Froſts, that we may almoſt hope, that by this branch of Philoſophy, when it ſhall be as carefully Cultivated, as Chymiſtry now is, we may perform as much, if not more and ſtranger things than are yet done by Fire. I do often ask Gardeners, and skilful Husbandmen, whether all ſorts of Land are more fertiliz'd, or more ſpeedily, by the ſolar Influence in our Climate, or by Froſts. For theſe two are the two buſy hands, which manure all kinds of Earth and Water into grateful pregnancy, as *Virgil* of Old,

Illa ſeges demùm votis reſpondet avari
Agricolæ, bis quæ ſolem, bis frigora ſenſit. 1 *Georg*. v. 47.

And they generally affirm, that Froſt and Snow make the quicker diſpatch amongſt us, and the more general and richer Fertility. And, that ſome Diſtillations may be made by Froſts, I have this proof: At my requeſt you were pleas'd to get me a Thermometer of a very ſmal and ſlender Stem, eſpecially the higher parts for 10 Inches near the head: All that ſee it, do wonder how ſuch a ſlender Glaſs could be ſafely conveighed hither: The Spirit of wine is very deeply tinged, which renders it in that ſmalneſs clearly viſible: I expoſed it out of Doors in the hardeſt Froſts of the extreame winter *Anno* 1665. when the winds were alſo violently ſharpe. In thoſe Froſts there aſcended into the top of the Glaſs ſmall drops like a Dew, which afterwards in time deſcended into the ſtem, and filled up the ſpace of an Inch or thereabouts, and it was as clear, and bright, and more flickering, than any Chryſtal, or Glaſs. On the contrary, in the heat of the Summer I placed a ſtronger Thermometer of ſlow Motion on a Sunny wall, till a part of the Liquor aſcended into the top, and there continued ſome hours: Then by ſloping the Glaſs I divided it from the reſt at a little diſtance. And this took up two inches in the ſtem, being at firſt of a very pale reddiſhneſs. I gueſs it contained much of the Spirit of Vrine, which at firſt was intermingled with the Spirit of Wine; but in a ſhort time all the reddiſhneſs was quite conſumed: And ſince it remaines of a tranſparent, but very dull clearneſs, in no degree ſo bright, and flickering, as the other. If this proves a diſtillation of the ſame kind, and not differing from diſtillations by heate, then it may excuſe my expreſſion above, of the coincidence of extreames. If it proves a diſtillation of another kind, then there is a freſh task for Philoſophers. However, whether one or the other be true, we are ſure, that falſe grounds and vain hopes have done Infinite good to us and to our Poſterity by *Pyrotechne*. And why may not we accept of ſpecious hopes to attempt ſomething in *Pſychrotechne*? But I made another tryal with the ſtronger Thermometer: By which, and by other argu-guments, I am convinced, that manifold uſes may be made of our Icy Conſervatories for the Conſervation of ſome Bodyes, and for ſtrange alterations on others, as they are placed, higher or lower; nearer to or further from the Snow or Ice. But this and other matters, and eſpecially ſuch as pertain to the quick and cheap fertilizing of any ſorts of Land for Hortulan uſes, I muſt reſerve for another time: And then I ſhall not put you off with Projects; but give you the evidence of ſure and ſafe Experience; and ſuch as may be much more uſeful, than this or the former is either curious, or extravagant.

De Reſpirationis Uſu Primario Diatriba, *Auth. Malachia Thruſton M. D. Cui accedunt Animadverſiones à Cl. Viro in eandem conſcriptæ, una cum Reſponſionibus Authoris. Londini, apud* Joh. Martyn, *Reg. Societ. Typographum ad inſigne Campanæ*, 1670.

THis Learned Author,a worthy Member of the *R. Society*,in diſcourſing upon this no leſs difficult than important ſubject,obſerves this Method;

Firſt, he lays for a ground,that there is and needs muſt be Motion in the Bloud. *Secondly*, he declares;what kind of Motion,and how various that is,ſhewing alſo,that all thoſe motions are to be adſcribed to the *Vital Bloud*,and to be preſerved therein. *Thirdly*, he maketh it his buſineſs to prove (which is his main deſign) that thoſe Motions are both continually produced,and maintained by the means of *Reſpiration*,premiſing ſomething about the Nature and Properties of the *Air*,and the *Fabrick* and Motion of the *Pneumatick* parts.

This done, he ſheweth the probability of his *Hypotheſis*,as being intelligible,and able to ſolve innumerable queſtions, and among them ſuch , as have been eſteemed almoſt inſoluble. And *firſt*,he teaches,how Reſpiration maintains that *Progreſſive* Motion,which he alſo cals the Motion of *Rivers*; and then,how it preſerveth the Motions of *Fluidity*,and *Warmth*, by the Airs ſubduing,comminuting,and dilating the Blood. Where he digreſſeth to give an Anſwer to thoſe,that will not allow the Air to have any ingreſs into the Bloud; as alſo to explain the cauſe of *Sanguification*, adſcribing it neither to the Heart nor the Liver , but principally to the *Lungs* in thoſe that are borne ; but in *Fœtus's*,to the maternal Bloud, and the Vmbilical veſſels.

Next,he proceeds to explicate the many *Problems* of Reſpiration by the delivered *Hypotheſis:* And chiefly why Reſpiration is ſo abſolutely neceſſary to Life,viz.becauſe Life principally conſiſts in the motion of the Bloud;which ſoon ceaſeth, when Reſpiration is ſtopp'd. Upon which Queſtion thus reſolved,depends alſo the ſolution of divers others, to be found in this Book.

To all which he adds the reaſon of the Difference, there is, as to Reſpiration, between the Borne and Vn-borne ; ſolving that knotty *Hervean* Problem , *viz.* Why a *Fœtus*, being diveſted of the *Secondine* , and having once breathed in the open Air,cannot live afterwards without it , but dyes preſently ? Which he imputes to the hindred Motion of the Bloud , entertained by Reſpiration.

But why, after that Reſpiration hath once begun , the Bloud will not , when there is need,return to its former paſſage through the *Foramen Ovale* ; we refer to the Author himſelf for an Anſwer : as we alſo do for other conſiderable Solutions of many other difficulties occurring in this Learned Treatiſe.

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A Cat.

PHILOSOPHICAL
Tranſactions:

GIVING SOME

ACCOMPT

OF THE

Preſent Uudertakings, Studies, and Labours

OF THE

INGENIOUS

IN MANY

CONSIDERABLE PARTS

OF THE

WORLD.

VOL. V.

For *Anno* 1670.

LONDON,

Printed for *John Martyn* at the Bell in St. *Pauls* Church-Yard; Printer to the *Royal Society*.